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# Accessibility and Resilience in Post-Earthquake Christchurch.

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**Will increased universal accessibility lead to a more resilient Christchurch?**



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## 1. Abstract

This research examines the connection between accessibility and resilience in post-earthquake Christchurch. This research will provide my community partner with a useful evidence base to help show that increased accessibility does create a more resilient environment. This research uses an in-depth literature review along with qualitative interview approach discussing current levels of accessibility and resilience in Christchurch and whether or not the interview participants believe that increased accessibility in Christchurch will make our city more resilient to future disasters. This research is important because it helps to bridge the connection between accessibility and resilience by showing how accessibility is an important aspect of making a city resilient. In Christchurch specifically, it is a great time to create an accessible and inclusive environment in the post-earthquake rebuild state the city is currently in. Showing that an accessible environment will lead to a more resilient city is important will potentially lead to accessible design being included in the rebuild of places and spaces in Christchurch. In theory, the results of this research show that having an accessible environment leads to universal inclusiveness which in turn, leads to a resilient city. An overarching theme that arose during this research is that accessibility is a means to inclusion and without inclusion a society cannot be resilient. In practice, the results show that for Christchurch to become more accessible and inclusive for people with disabilities, there needs to not only be an increase the accessibility of places and spaces but accessibility to the community as well. Having accessible infrastructure and communities will lead to increased social and urban resilience, especially for individuals with disabilities. This research is beneficial because it helps to bridge the connection between accessibility and resilience. Resilience is important because it help cities prepare for, respond to and recover from disasters and this research helps to show that accessibility is an important part of creating resilience. Some questions still remain unresolved mainly looking into normalising accessibility and deciphering how to prove that accessibility is an issue that effects everybody, not just individuals with disabilities.

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## 2. Introduction

### 2.1. Overview of Research

This research is for my master's project under the Masters of Urban Resilience and Renewal at the University of Canterbury. This research will discuss accessibility and resilience from a geographical framework by looking into how society can adapt and change to better create resilient and accessible cities for everyone. Cities today are facing many challenges such as, climate change, demographic growth and urban spread. Studying how cities and communities will adapt to, respond to, and become resilient to these challenges is still a relatively new concept. Christchurch is facing an issue with resilience and renewal after the September 2010 and February 2011 earthquakes and community engagement is increasing surrounding these issues. Internationally as well, people are becoming more aware of the increasing challenges cities face, and because of this there is a greater desire for urban environments to become more resilient. A study by *Barkham et al [2014]* completed a thorough analysis of fifty cities worldwide to determine their resilience levels and what aspects of these cities made them resilient or not. These studies along with a number of previous research reports show that resilience is an important concept, these studies are discussed further in section 4 of this research. Accessibility is an issue that is becoming more and more to the forefront of human society. In New Zealand alone approximately one in four people define themselves as having a disability (Statistics New Zealand, 2014). While accessibility is a big issue for people with disabilities, accessibility is not an issue that only affects individuals with disabilities, it affects everybody. Resilience is a new idea that looks into how well environments can deal with stresses and fractures. For the purpose of this research accessibility and resilience will have predetermined definitions that will be defined in section 2 of this proposal. Accessibility looks into with how much ease individuals are able to access urban environments while resilience is about how well urban environments prepare for, respond to and recover from disasters.

This research is going to take an in depth look into the relationship between accessibility and resilience in order to determine whether or not cities with high levels of accessibility are more resilient. While there is research analysing the relationship between accessibility and

resilience, this is very limited, and there is still a definite gap in this research, which will be elaborated on in section 1.2 of this study. The current research surrounding accessibility and resilience will be discussed in a thorough literature review. Then the relevant research linking accessibility and resilience will be brought back to Christchurch to see how resilient and accessible Christchurch is at present, as well as what the city can do to become more accessible and resilient in the future. Interviews will be undertaken with professionals working in the accessibility and/or resilient sectors and a number of these participants will exhibit a physical mobility disability. These interviews will be an important part of this research to get first hand opinions on the state of the Christchurch rebuild and accessibility and resilience within the city. In the current state of rebuild that Christchurch is in it is the perfect time to create infrastructure and transportation that is accessible to all.

This research is important because proving that having higher levels of accessibility will potentially lead to a more resilience will help show to companies in charge of rebuilding the city that accessibility should be included in the rebuild and design of new infrastructure and transportation. This research is also important because creating an accessible environment will create a higher satisfaction of life for individuals with disabilities. People with disabilities encompasses a large group of individuals, that is further discussed in section 3.3 of this research, and with one in four New Zealanders living with a disability it is important to create accessible cities so all individuals are included in the cities resilience levels.

Special consideration for people living with disabilities will be accounted for in this research because accessibility is a major issue for individuals with disabilities. During the Christchurch earthquakes, individuals with disabilities were a group that had a high level of vulnerability. At the time of the Canterbury earthquakes the current estimate of people living with disabilities in the region was 160,000. Of these, 58,000 people required assistance as a direct result of the earthquakes (Campbell, 2017). The major causes for the large amount of people with disabilities needing assistance after the Canterbury earthquakes was the inaccessibility of a range of disability services including, residential services, schools, community support services and day activity centres (Campbell, 2017). *Bourke [2017]* also discussed how this need for assistance can be a direct result of damaged infrastructure, inaccessible shelters and poor access to supplies and equipment. Individuals with disabilities also lost social and community resilience as a result of the Canterbury earthquakes, with

individuals with disabilities reporting increased levels of stress and a decrease in the quality of life (Bourke, 2017). This loss of community resilience came from people with disabilities feeling isolated from their communities because damaged housing, transportation and infrastructure restricted the movement of people with disabilities around their communities (Bourke, 2017).

Resilient cities are an important part of creating safe places for humans to interact, engage and live in. A number of studies have discussed the importance of resilient cities. The *100 Resilient Cities [2014]* give six reasons why cities are important and why they should be made resilient. These include; more than half the world living in cities, by 2050 70% of the world's population will live in cities, and that cities have been for centuries, and still are today, the centre of civilization, life and knowledge. (Shariat, 2014) These reasons mixed with the greater concentration of people in urban areas and the increasingly complex range of shocks and stresses worldwide have led to the desire for cities to become more resilient. (The World Bank, 2017)

The community partner for this research is Amy Hartnell from the Earthquake Disability Leadership Group. The vision of the EDLG is for a: "recovery and rebuild of Greater Christchurch that results in a genuinely accessible and liveable place for all of its citizens to participate in and belong to" (Earthquake Disability Leadership Group, 2017). The EDLG have an interest in this line of research because they believe accessibility is a key requirement of making cities resilient. The Earthquake Disability Leadership Group have been working tirelessly alongside a number of organisations to champion accessibility in Christchurch. In November 2017 they helped to launch the Canterbury Accessibility Charter which aims to ensure all environments are universally accessible, to enable Cantabrians and visitors to Canterbury to live, work, learn, visit and play equally and to set a collective expectation of best practice design, construction and delivery, beyond the minimum expectations of the building code. Although, there is limited research into the connection between accessibility and resilience at this time. The connection between accessibility and resilience is an issue with importance to the EDLG because accessibility affects disabled people's life on a daily basis. Therefore, when disasters occur people with disabilities are extremely vulnerable because day-to-day life is already harder for them. Having more accessible and resilient



cities will have a greater impact on people with disabilities and therefore the Earthquake Disability Leadership Group are interested in this line of research.

## 2.2. Research Gap

While there is research looking into accessibility and transportation, there is little research considering all aspects of an urban environment and how they are connected to accessibility and resilience. There is also a gap in research surrounding how people with disabilities are affected by accessibility and resilience issues. This research will look to fill this gap and determine whether or not accessibility is a key requirement of a resilient city. This research gap exists because both accessibility and resilience are recent ideas that were developed in the latter half of the 20<sup>th</sup> Century. Hansen was the first to define accessibility in 1959 and Holling was the first to define resilience in 1973 (Batabyal, 2016). While these definitions for accessibility and resilience are very simplified they do provide the basis for the definitions used in this research. The desire for research on the connection between accessibility and resilience was shown by *Geurs et al [2012]* who stated to the best of their knowledge: “there is no knowledge on the relationship between accessibility and resilience.” While these authors briefly discuss the relationship between these two concepts they conclude by saying: “more research addressing the issue of accessibility versus connectivity and resilience would be desirable.” This research will look to fill this study gap surrounding accessibility and resilience in the urban environment. There is also a research gap in looking at the resilience of people with disabilities following a disaster and this is described by *Bourke [2017]*. He explains that: “scant research has explored the perspective of people who experienced disability regarding recovery over the longer term following a disaster.”

## 2.3. Study Area

The study area for this research is Christchurch City. Christchurch is home to 381,5000 inhabitants as of 2017, with 612,000 people living in the Canterbury region. (Christchurch City Council, 2017) Christchurch has the second highest number of individuals with

disabilities living in the region throughout New Zealand and in the phase of rebuild after the Canterbury earthquakes the city is in a prime state to create an accessible city. Figure 1 below emphasises the high number of individuals with disabilities in Christchurch. Christchurch also has a strong car culture with 64.1% of Christchurch inhabitants opting to use a private car, truck or van compared to only 7.0% using bicycles as their main transport method. Reducing the dependency of cars and increasing the usage of active mode transport, such as biking and walking, is an important part of creating an accessible city. Employment in New Zealand for people with disabilities is significantly lower than able-bodied individuals. This can be seen in Figure 2 below, with 11.4% of people with disabilities still unemployed compared to 4.5% of able-bodied individuals. (Statistics New Zealand, 2017) In Christchurch, employment for people with disabilities is also an issue because a number of jobs created by the rebuild are inaccessible to them. This is an interesting and important time to further research the connection between accessibility and resilience in Christchurch city. Trying to create a more resilient city during the rebuild of the city is a highly discussed topic in Christchurch at the moment and with the high number of individuals with disabilities living in the city there is a desire to create a more accessible Christchurch.

<b>Disability rates by region</b>		
<b>Region</b>	<b>Number of disabled people</b>	<b>Disability rate (%)</b>
Northland	44,000	29
Auckland	271,000	19
Waikato	105,000	25
Bay of Plenty	73,000	27
Gisborne/Hawke's Bay	46,000	23
Taranaki	36,000	30
Manawatu-Wanganui	67,000	27
Wellington	114,000	22
Canterbury	143,000	25
Otago	52,000	26
Southland	27,000	26
Rest of South Island <sup>(1)</sup>	41,000	27
<b>New Zealand</b>	<b>1,020,000</b>	<b>23</b>
1. Includes Nelson, Tasman, Marlborough, and the West Coast regions.		

Figure 1: Disability Rates by Region (Statistics New Zealand, 2013)

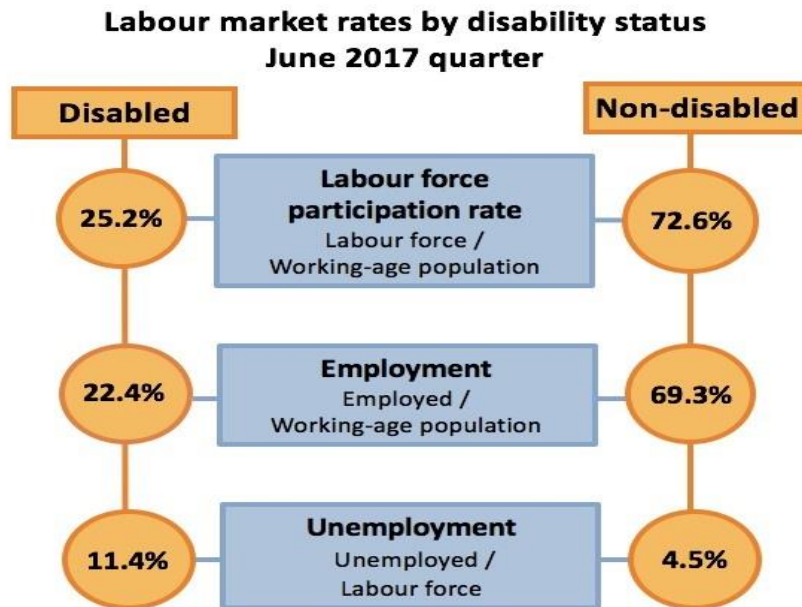


Figure 2 : Disabled vs Non-Disabled Employment Statistics (Statistics New Zealand, 2017)

### 3. Definitions

#### 3.1. Accessibility

Accessibility has many definitions and has been associated with many aspects of urban planning since *Hansen [1959]* first defined accessibility as; “the potential of opportunity for interaction” (Batabyal, 2016). *Henry, Abou-Zahra and Brewer [2014]* define accessible as the “design for people with disabilities.” They go on to express that while accessibility is focused on those individuals with disabilities, implementing accessible design will benefit everybody. Universal design is the process of creating infrastructure, transportation and products that are usable to all individuals with the same level of ease (Henry, Abou-Zahra, & Brewer, 2014). The definition of accessibility for this study will be slightly different to Hansen’s definition, however his definition formed the basis of it. This is because over the years the definition for accessibility has become more complex than when Hansen originally defined it in 1959. Accessibility defines the whole journey an individual takes from a starting point to their end location, including transportation. All parts of the journey must be accounted for and a universally accessible city or community will allow any individual, not matter their age or impairment, to complete the journey with the same level of ease (Bourke, 2017). This concept is known as the accessible journey and can be looked at from the human rights perspective as well as the technical side. The technical side is about approachability, accessibility and usability of the built environment in relation to especially people with disabilities (Human Rights Commission, 2005). The Human Rights Commission did a report on the accessible Journey from a human rights perspective. This report uncovered that creating universal accessibility of the accessible journey isn’t just about the technical side. It also encompasses creating availability, affordability, accessibility and acceptability along all aspects of the accessible journey (Human Rights Commission, 2005). Accessibility, for this research, will be defined as the ease with which all individuals, including, but not restricted to, people with disabilities, are able to access and engage in urban environments, such as cities.

Accessibility can be used to describe access issues at a variety of scales, from the micro scale to an entire urban environment. Micro-scale issues include damaged footpaths that can

impede accessibility and inaccessible entrances. This report will focus more on the idea of the ‘accessible journey’ when discussing accessibility, this is because this idea has more of an impact on how individuals with disabilities interact with an urban environment. Figure 3 below gives recommendations that is believed to be needed to allow for Christchurch to be the “most liveable city in the world for people of all ages and disabilities.” (Healthy Christchurch, n.d.)

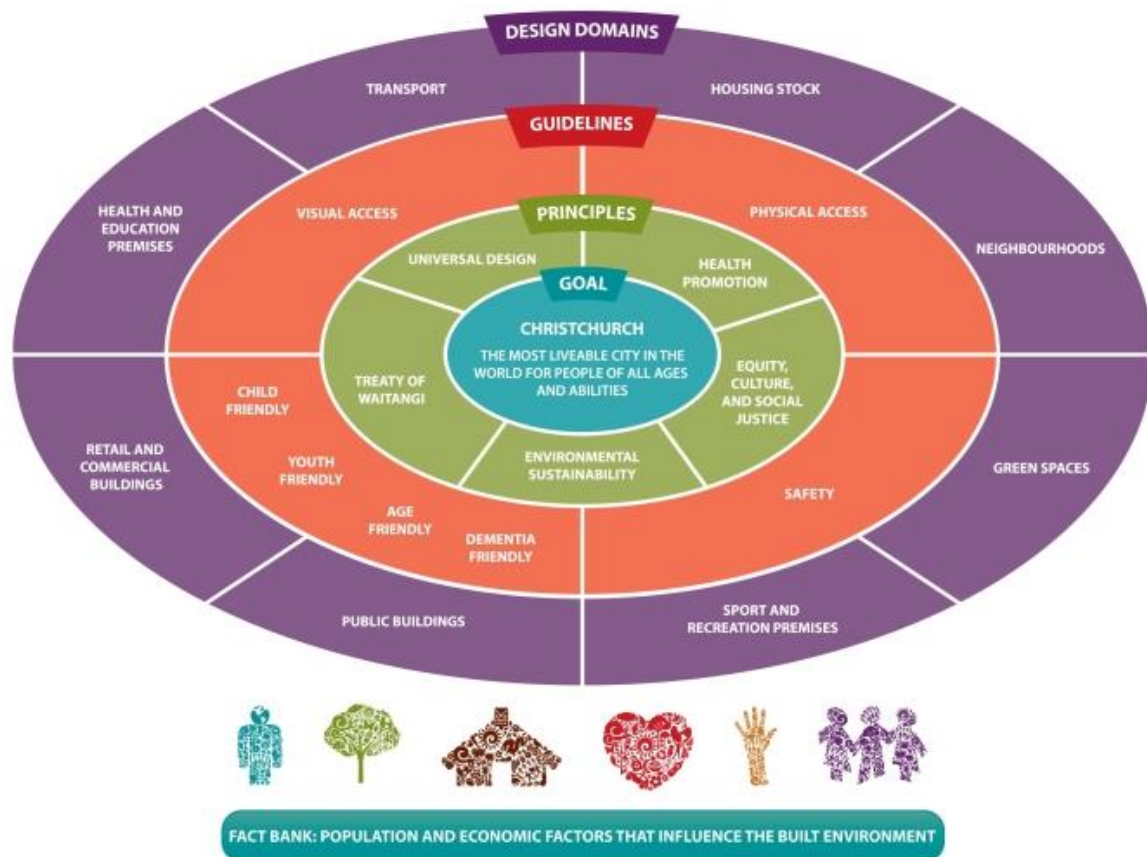


Figure 3: Accessible City Guide (Healthy Christchurch, n.d.)

### 3.2. Resilience

Resilience is a complex, multidisciplinary phenomenon, and because of this a number of different concepts and definitions have grown throughout the years. The origins of resilience stem back to *Holling [1973]* who defined resilience as the “ability of an ecological system to continue function when changed” (Batabyal, 2016). While there are a number of different concepts for resilience today, this study will focus on those regarding urban

resilience, in particular a city's resilience. *Jarabreen [2012]* recently defined resilience as “the capacity of a system to undergo disturbance and maintain its functions and controls,” whereas *Ahern [2011]* defined resilience “as the capacity of a system to respond to change or disturbance without change its basic state” (Ahern, 2011). More specifically to urban environments, *Liao [2012]* defined urban resilience as “the capacity of the city to tolerate flooding and to reorganise should physical damage and socioeconomic disruption occur, so as to prevent deaths and injuries and maintain current socioeconomic identity” (Meerow, Newell, & Stults, 2016). Resilience, for this study, will be defined as a cities capability to prepare for, respond to, and recover from threats, stresses and fractures while maintaining a high level of public health and safety, economy and security for everyone.

There are four major types of resilience that need to be considered for this research and these are; social resilience, community resilience, urban resilience and disaster resilience. Social resilience has been defined by *Jha, Miner and Stanton-Geddes [2013]* as the “capacity of individuals within a community or society to cope with and adapt to disturbances or changes.” Community resilience discusses how a whole neighbourhood or city acts resilient rather than the individuals that inhabit the community. *Bach, Doran Gibb, Kaufman and Settle [2010]* define community resilience as; “communities and individuals harnessing local resources and expertise to help themselves in an emergency, in a way that complements the response of the emergency services.” Urban resilience is defined by *Leichenko [2011]* as; “the ability of a city or urban system to withstand a wide array of shocks and stresses.” It is important to consider infrastructural resilience when looking into urban resilience. Infrastructural resilience is defined by *Jha et al [2013]* as; “the vulnerability of built structures... it also refers to sheltering capacity, health care facilities, the vulnerability of buildings to hazards... and the availability of roads for evacuation.” *Meerow, Newell and Stults [2016]* expanded on this definition to define urban resilience as; “the ability of an urban system – and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales – to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity.” Disaster resilience looks into how well an environment can adapt to and recover from a disaster, whether natural or human made.

### 3.3. People with Disabilities

Disabilities is a widely used term that covers impairments, activity limitations, and participation restrictions. *The World Health Organisation [2017]* defines impairments “as a problem(s) in body function or structure,” an activity limitation “as a difficulty encountered by an individual in executing a task or action,” and a participation restriction “as a problem experienced by an individual in involvement in life situations.” In New Zealand specifically, *The Statistics NZ [2014]* Disability Survey defines disability as the; “long-term limitation (resulting from impairment) in a person’s ability to carry out daily activities.” When breaking down disability into groups the 2013 Disability survey defines these categories as; hearing impairment, mobility impairment, agility impairment, psychological/psychiatric impairment, intellectual impairment, learning impairment, memory impairment and difficulties with speaking. (Statistics New Zealand, 2014) Whereas their definition of a person with a disability is: “A person with a disability is a person who is limited in the kind or amount of activities that he or she can do because of on-going difficulties due to a long-term physical condition, mental condition or health problem. Short-term disabilities due to temporary conditions such as broken legs and illnesses are excluded. Only disabilities lasting for more than six months should be included” (Statistics NZ, 2015) For the purpose of this study the definition of people with disabilities will be restricted to those with physical mobility disabilities. These physical mobility disabilities include, wheelchair users, and blind and vision impaired individuals.

Disabilities can encompass a larger group of people including; aging population, people with temporary injuries, parents with babies, and individuals who do not speak English. Whilst these individuals are not in the contemporary definition of disabilities, creating an accessible city will greatly benefit these groups of people. These groups of individuals can be encompassed in the disability sector because they can be greatly impaired by physical access issues, which this research discusses. Therefore, they are an important part of this research because accessibility will greatly benefit how well they can interact with the urban environment. An important point to remember is that most people develop a disability during their lives, whether temporary or permanent, and it is important to consider all individuals when creating accessible cities.

## 4. Literature Review

### 4.1. Connection between Accessibility and Resilience

There is already some literature that discusses the importance that accessibility has for resilient cities. *Osth et al [2015]* looks into cities and rural areas in Sweden and tries to determine what types of urban environments have high accessibility and resilience and those that have low accessibility and resilience. They determined that areas with high accessibility and resilience are major economic centres that are both job and population rich. While areas with low resilience and accessibility are rural centres that are experiencing population loss. This research should complement this study because it indicates that large cities that have high accessibility tend to be more resilient. Accessibility in this research is specifically looking into the distances and ease it is to get around cities with a reasonable commute time. This definition of accessibility differs from this study's, however this research is still relevant to this study because it helps to form a connection between resilience and accessibility. More research was found into the connection between accessibility and resilience and this study was undertaken by *Geurs et al [2012]*. While they mostly discuss the connection of accessibility and resilience in terms of transport networks they do confirm that accessibility is fundamental for the development of environments. (Geurs, Krizek, & Reggiani, 2012). *Geurs et al [2012]* also discuss how isolated networks are fragile and by increasing their accessibility and linkages the effects of shocks can be prevented, leading to more resilient networks (Geurs, Krizek, & Reggiani, 2012). This research will complement this study because it shows that there is a link between networks having high accessibility and resilience. This research will be able to be applied in order to help determine how a city being accessible leads to increased resilience.

There is a lot of research linking transportation accessibility and resilience. *Newman et al [2009]* discovered that cities that have an accessible, efficient and affordable transportation system can easily adapt to the expanding population and become more resilient than cities without one. This is interesting in developing the idea of accessibility and resilience and is one aspect of the urban environment that is important when deciding whether or not accessibility is a key requirement of a resilient city. While this research project will



complement the work done by *Newman et al [2009]*, the one major difference with this research is that it will not be restricted to transportation when considering accessibility in an urban environment. Also, this research will have a specific focus on individuals with disabilities when determining the accessibility and resilience of urban environment, where *Newman et al* did not account for this in their research.

Research looking at the connection between transport accessibility and resilience, in terms of the peak oil crisis, was studied by *Rendall, Page, Reitsma, van Houten and Krumdieck [2011]*. They believe that in order for cities to become more resilient to future oil supplies a reduction in the energy intensity of private transport is the most cost-effective approach to mitigate these uncertainties. Reduction in the energy intensity of private transport means using active methods of transport, such as walking and biking, to get around instead of cars. *Rendall et al [2011]* developed the concept of Active Mode Accessibility (AMA) which is defined as the proportion of activities that can be reached by active modes alone, given the population demographics of the area. An area that has a high AMA means that it has more easily accessible destinations that can be served with minimal energy input, leading to higher levels of resilience to the peak oil crisis. Their case study area compared Christchurch Central with Rolleston to determine each areas AMA and resilience levels. They concluded that Christchurch Central has a 100% AMA making it more resilient to the peak oil crisis, and Rolleston having an AMA of 59% meaning it is less resilient and accessible. Christchurch was given a higher AMA because it had a high density of easily accessible destinations and a wide range of local facilities available for every activity, therefore making it more resilient than Rolleston which lacked a number of easily accessible destinations (*Rendall et al, 2011*). While this research will complement by own it does not take into account individuals with disabilities when determining the resilience of Christchurch. Questions that could have been asked when conducting the research could have been around whether or not individuals with disabilities can partake in these active transport modes.

*The United Nations [2015]* created the 17 Sustainable Development Goals which are targets countries need to achieve and range across a broad number of development, social and economic issues. Goal 11 is to “make cities inclusive, safe, resilient and sustainable.” This goal is about dealing with the number of challenges cities face today including congestion, lack of funds to provide basic services, a shortage of adequate housing and declining

infrastructure. As well as making sure cities provide equal opportunities for all, with access to basic services, energy, housing, transportation and more. This development goal has a number of targets that are set to be achieved by 2030 which include; safe, affordable, accessible and sustainable transport systems for all, have an enhanced inclusive and sustainable urbanization and capacity for participation, and providing universal access to safe, inclusive and accessible, green and public spaces, in particular for people with disabilities (The United Nations, 2015). A number of these development targets are surrounding accessibility of the built environment and how increasing these over the next 12 years will lead to more resilient and sustainable cities. This supports this research topic by acknowledging that there is in fact a connection between accessibility and resilience in built environment.

#### 4.2. What Makes a City Resilient?

When looking into resilient cities, the United Nations Office for Disaster Risk Reduction (UNISDR) created “The Ten Essentials for Making Cities Resilient.” Two of these essentials can be related to a cities level of accessibility; Essential Four: Infrastructure Protection, Upgrading and Resilience and Essential Six: Building Regulations and land Use Planning. Essential Four is surrounding the creation of more resilient infrastructure, this includes ensuring that roads and sites are accessible in case of emergencies (United Nations Office for Disaster Risk Management, 2012). While Essential Six does not specifically discuss the importance of accessibility it does enforce the idea that governments need to set higher building standards through creating building codes and regulations. These increased building standards will force cities to build infrastructure to be less vulnerable to disasters, such as earthquakes, by taking into account the need of population (United Nations Office for Disaster Risk Management, 2012). Other essentials in this document include: putting in place an organisation and coordination to understand and reduce disaster risk, assigning a budget for disaster risk reduction and provide incentives to people to invest in reducing risks, maintaining up-to-date data on hazards and vulnerabilities, and teaching people and organisations on how to make themselves more resilient (United Nations Office for Disaster

Risk Management, 2012). This report will accompany this research as it helps to identify the idea that accessibility is an essential element of a resilient city.

*The Board on Health Sciences Policy et al [2015]* have done extensive research on what aspects are required to create healthy, resilient communities after disasters. They have outlined what they believe are key recovery strategies for the social services sector that should be implemented for short-term and long-term disaster recovery. These key strategies include, enhancing efforts to increase accessibility to reach the most vulnerable populations to provide required social services (Board on Health Sciences Policy, Institute of Medicine, Committee on Post-Disaster Recovery of a Community's Public Health, Medical and Social Services, 2015). The 'accessibility' mentioned here is described as having many different dimensions including; "physical location and accessibility to those with handicaps, hours of operation, and availability of materials and services in a number of languages (Board on Health Sciences Policy, Institute of Medicine, Committee on Post-Disaster Recovery of a Community's Public Health, Medical and Social Services, 2015). This report also describes how creating an optimal and healthy post-disaster community includes maximizing the accessibility and quality of medical care, urgent and emergency services and home health care services. The idea of a healthy community in the report also relates to the community being resilient to disasters, helping to prove that there is a correlation between accessibility and resilience. It has been proven that enhancing community resilience is a significant factor in effectively preparing for, responding to, and recovering from disasters (Campbell, 2017). This study will supplement this research because their research has come to the conclusion that having life essentials easily accessible after a disaster will lead to a healthier and resilient city.

Social resilience is also seen as an important part of making a city resilient. Social resilience is "the capacity of individuals within a community or society to cope with and adapt to disturbances and changes (Jha A.K, Milner T.W, and Stanton-Geddes, Z, 2013). *Hartz-Karp and Meister [2011]* discuss the importance of social resilience through community participation in the resilience of a city to climate change and future disasters. They believe that in order for cities to become resilient they need to not only discuss issues with important stakeholders but also have citizens play an important role in effective climate change action (Hartz-Karp & Meister, 2011). This type of approach is similar to the bottom-

up style approach discussed by *Gaster [1996]*. This type of approach allows all individuals to participate in creating resilient cities, this can also lead to creating resilient communities which increases resilience through social interaction.

There is a growing recognition worldwide that cities need to become more resilient to future disasters, especially climate change. The International Panel for Climate Change discussed at the 2010 Global Forum on Climate Change that current temperature increases will result in greater vulnerabilities to urban environments including, food supply, infrastructure, health, water resources and coastal systems. If global temperatures begin to increase at a higher rate there is the potential for a significant loss of biodiversity, decreasing global agricultural productivity and glacial melt. (Konrad Otto-Zimmerman, 2011). With urban areas housing half of the world populations, and estimated to host two thirds of all humans by 2050 there is a need for urban environments to adapt to become more resilient to climate change (Konrad Otto-Zimmerman, 2011). Christchurch is a city that is highly susceptible to the effects of climate change due to its close proximity to the coast and its low lying urban environment. *Inamura [2016]* discusses that while disasters are a natural phenomenon the rebuild and recovery from a disaster are social and cultural phenomena.

Within cities there are disparities that mean certain areas of the city are more vulnerable than others. *Opitz-Stapleton et al [2011]* also discuss how poorer populations will be hit hardest by disasters as they have the least capacity to prepare and plan for them as well as having the least capacity to respond to threat. These areas tend to be slums and the urban poor and this is a result of the location of their homes and livelihoods and the lack of reliable basic resources. *Wilhelm [2011]* studied the slums in Jakarta, which make up 60-70% of the population, to determine how they developed forms of resilience. He discovered that the major way these slums created resilience was through collective action or social capital. *Putnam [2000]* defines social capital as the “connections among individuals, - social networks and the norms of reciprocity and trustworthiness that arise from them.” To make this strong social capital in the slums in Jakarta, residents pool and organise their scarce resources together and also establish networks with external parties (Wilhelm, 2011). An informal warning system has also been implemented in these slums that is based on communication with employees at the flood gates and with family and friends upstream.

This warning systems allows slum residents to prepare for disasters and makes them more resilient. While this is an extreme example of urban disparities, Christchurch does experience similar poor/rich disparities and could therefore learn from Jakarta's form of local resilience through social capital. This form of resilience translates into adaptation and mitigation methods that can be applied to everyday situations, even in cities like Christchurch.

*The Guardian [2017]* ran a panel with urban development experts to discuss the main aspects of what makes a city resilient, they came up with four main aspects of creating a resilient city. They discussed how building social capital helps to create a resilient city and that "to be resilient means really understanding the issues – like identifying the vulnerable – before being able to plan and respond to them." (Brewer, 2017) Strong and accountable local leadership was also seen as an important issue, "this requires mayors to have a real understanding of the value of resilience as well as the ability to communicate this clearly across city officials, private sector and wider communities." (Brewer, 2017) Fostering partnerships to help with funding and accountability and joining international networks to share ideas and best practice are also seen as important aspects of resilient cities. (Brewer, 2017) All of these aspects are important and should be applied Christchurch to help create a resilient city during the rebuild.

#### 4.3. What Makes a City Accessible?

Accessibility is an issue that is facing many cities as they try make themselves universally accessible to all individuals, including those with disabilities. For decades cities have been built without thinking about how physical and social barriers affect individuals with disabilities (Office of the UN High Commissioner for Human Rights, n.d.). *The Office of the United Nations High Commissioner for Human Rights [n.d.]* believe that in order to make a city more universally accessible they need to allow people to move around by a number of different options. This includes, reducing the use of cars to promote the use of public transport, providing housing close to everyday destinations such as shops and work places and provide public spaces and facilities that are safe and accessible to users of all ages and abilities like sports centres. *Brown and Dixon [2014]* confirm the idea that accessible cities

should have housing within walking distances to everyday destinations. They state that liveability within urban environments is benefited from walkable environments and that having ready access to a broad range of amenities leads to a more accessible city. It is also one of the principles of urban design to promote equality and advance equitable access to liveability, community and opportunity for all. *The United Nations Division for Social Policy and Development [n.d]* add that while accessible infrastructure and transport is the key to an accessible city, there also needs to be universally accessible information, communications and other services including, electronic services and emergency services.

*The Committee on the Rights of Persons with Disabilities [2013]* discusses the issue of accessibility in cities and how cities can become more accessible to everyone, including individuals with disabilities. Without access to the physical environment, transportation, information and communication, including technologies and systems, and other facilities and services open or provided to the public, individuals with disabilities do not have equal opportunities for participation and inclusion in society (The Committee on the Rights of Persons with Disabilities, 2013). Unfortunately, even today there are a number of cities globally that do not have adequate universal accessibility, while there are some that are good examples of accessibility. An example of these accessible and inaccessible cities is discussed in section 4.4. In order to make cities accessible to all the Committee believes that a strict application of universal design needs to be implemented to all new goods, facilities, technologies and services. This will allow individuals with and without disabilities to move barrier free through streets, enter accessible low-floor vehicles, access information and communication and enter and move inside universally designed buildings (The Committee on the Rights of Persons with Disabilities, 2013).

*Polus and Craus [1996]* discuss the idea of shared streets and how this new design and concept of a street can help to make cities accessible to a wider variety of people. *Ruiz-Apilanez, Karimi, Garcia-Camacha and Martin [2017]* discuss how this approach to street design allows for increased movement of individuals using active modes of transport, such as biking and walking. A shared street is one that has a decreased amount of travel space for automobiles and an increase in the size of bike lanes and pedestrian pavements (Polus and Craus, 1996). I believe that this therefore increases the accessibility of the city because it makes it more universally accessible rather than only to those using automotive transport.

This is backed up by *Global Designing Cities Initiative* [n.d.] who state that shared streets should be implemented in areas of high pedestrian activity to discourage vehicle activity and make the area universally accessible. *Polus and Craus* [1996] also came to the conclusion that “shared streets provide an excellent, attractive accessibility solution for residential neighbourhoods.” Accessible streets having been criticized by disability groups. For vision impaired individuals they pose challenges because they lack cues for navigation and depend on street users to negotiate the right of way through eye contact, gestures and nods (U.S. Department of Transportation: Federal Highway Administration, 2017). This had led to a number of groups creating accessible shared streets including the Federal Highway Administration (FHWA) who designed shared streets to accommodate people with vision disabilities. See figure 4 below to see the outcomes of the research by the FHWA for creating accessible shared streets for vision impaired individuals. Some of the aspects of making a shared street accessible for individuals with vision impairments include; creating signs indicating pedestrian priority so vision impaired individuals can feel safe knowing bikes won’t impede their movements and creating raised crossings to manage speed of oncoming traffic to make crossing the shared zone, that cars can access, safer for vision impaired individuals. (U.S. Department of Transportation: Federal Highway Administration, 2017)

## 8.3 Shared Zone



Figure 4 - FHWA Accessible Shared Street Design for Vision Impaired Individuals (U.S. Department of Transportation: Federal Highway Administration, 2017)

While an accessible city has many benefits *Frumkin, Frank and Jackson [2004]* discuss how cities with high levels of accessibility and connectivity leads to numerous health benefits for individuals interacting with the environment. These types of urban environment promote alternative modes of transport to vehicles known as active transport modes, which includes biking and walking. Increased active mode transport leads to a decreased dependency on automobiles which leads to environmental benefits, including less air pollution, better air quality, and improves the respiratory and cardiovascular functions of individuals living in the community. *Frumkin, Frank and Jackson [2004]* discuss how proximity, connectivity and accessibility have tremendous importance in shaping how people travel within urban environments. A poorly connected transportation system can make nearby destinations far apart leading to people opting to drive to their destination rather than using an active mode



of transport (Frumkin, Frank and Jackson. 2004). This study complements this research because learning about the connection between accessibility and connectivity and healthy populations is an important aspect of this research because “accessibility is a feature of physical environments that helps promote physical activity” (Frumkin, Frank and Jackson. 2004). This is because promoting accessibility includes promoting alternative modes of transport, such as biking, public transport and walking, which leads to a healthier population. In an urban environment where more people drive more and less physical activity occurs, the population is more likely to be overweight and there is an increase in associated diseases. (Frumkin, Frank, & Jackson, 2004)

When cities expand to fit their growing populations, the type of spread seen by cities can be defined as either urban sprawl or smart growth. Urban sprawl refers to the migration of a population from populated towns and cities to low density residential development over more and more rural land (Conserve Energy Future, 2018). Many scholars have criticised the ideal of sprawl and some, like James Kunster of *The Geography of Nowhere*, believes sprawl is: “depressing, brutal, ugly, unhealthy, and spiritually degrading” (Frumkin, Frank, and Jackson. 2004). While sprawl is seen as detrimental to urban environment and its accessibility and resilience, smart growth is another form of urban development that’s principles are in many ways opposite to that of urban sprawl. The Ahwahnee Principles of Smart Growth are a set of principles created by a group of planners and architects during the 1991 Local Government Convention outlining community, regional and implementation principles. In Smart Growth community’s accessibility and connectivity are both high meaning that active mode transport is the preferred option by the majority of individuals. While there are many definitions and outlines for Smart Growth strategies, they all include mixed land use, decreased automobile dependency balanced by transportation alternatives (walking biking and transit) and increased density balanced by preservation of green spaces (Frumkin, Frank and Jackson, 2004). Smart Growth is important to this study because Christchurch is currently in a state of rebuild and expansion after the 2010/2011 earthquakes and resilient measures for expansion, such as Smart Growth, should be implemented to make the city more resilient in the future. The idea of smart growth discusses city level accessibility to destinations and this research is looking into an accessible city with an emphasis on the impact that accessibility issues have on people with disabilities.

The majority of current research explaining city growth patterns do not account for people with disabilities. This is a relatively unstudied aspect of accessible environments for people with disabilities will be a theory that will be discussed during this research.

The New Urban Agenda is a document created by the Habitat III Cities Conference, which aim is to guide the efforts around inclusive urbanization and creating urban environments that are universally inclusive (United Nations, 2016). All of the world leaders at this conference came up with a shared vision of what they believe an inclusive society would look like, this vision was integrated with the Sustainable Development Goal 11 which entails making cities and human settlements inclusive, safe resilient and sustainable. Their shared vision included prioritizing universal access to drinking water, public goods, quality services such as food security and nutrition, health, education, infrastructure, mobility, transportation, and public spaces (United Nations, 2016).

#### 4.4. International Examples of Accessible and Resilient Cities

There are number of cities internationally, that have made a dedication to become universally accessible to all of their inhabitants and visitors. For the purpose of this study, Gothenburg and Vancouver have been chosen to be international example which Christchurch could learn from to become more accessible. These international examples will help reinforce this study because these cities already have accessible infrastructure and measures in place and have been internationally recognised as some of the most accessible cities in the world by a number of research studies including the Grosvenor Report by *Barkham et al [2014]*. As a result, some of the methods in place in these cities could be implemented in Christchurch to help make the city more accessible post-earthquakes.

The City of Vancouver has done a lot of work to create an accessible city in order to become a world leader in accessibility for people with disabilities including; accessible buildings, walking paths, public transport, recreation activities and parking. (City of Vancouver, 2018) With Vancouver becoming an increasingly accessible city, it would be interesting to determine the city's resilience level to evaluate whether or not having good levels of accessibility can be a factor of being resilient. *Barkham et al [2014]* did a study determining

the resilience levels of fifty cities around the world. They defined resilience as; “the ability of a city to avoid or bounce back from an adverse effect.” One of this study’s aspects in determining resilience was the accessibility to energy, food and water within a city. Out of all fifty cities in this study, Vancouver ranked second with a resilience score of 98/100 (Barkham, et al., 2014). On the other end of the spectrum, Shanghai was seen as one of the least resilient cities studied, with one of the main reasons for this being its highly-congested infrastructure and transportation systems (Barkham, et al., 2014). While this research helps to show that Vancouver is one of the more resilient cities in the world, as well as having high levels of accessibility, there is still no research proving that accessibility is one of the reasons why Vancouver is a resilient city.

Another example of an internationally accessible city is the City of Gothenburg, which is Sweden’s second largest city. The city, along with the rest of Sweden has signed up to the UN Declaration of Human Rights and has a vision of making Gothenburg into a city that is accessible for every citizen (City of Gothenburg, 2014). In 2014 Gothenburg City won the European Union Commission’s Access City Award, which values accessible public spaces, transport, and information and communication (City of Gothenburg, n.d.). To face the issue of accessibility Gothenburg has taken the approach of community consultation, this has included the appointment of an accessibility advisor (City of Gothenburg, 2014). To make sure the citizens of Gothenburg are consulted on issues surround accessibility, an urban environment questionnaire is sent out every two years for a follow up on what the citizens think about the environment and what they believe can be improved or changed (City of Gothenburg, 2014). One of the main issues facing the city of Gothenburg is their aging population. To deal with this the government has created development centres for older people, which works with elderly people to come up with strategies on how to meet the aging population with skills, housing development and welfare technology. Gothenburg has also made it compulsory that accessibility be considered at the stage of the detailed development plan with all new housing and developments being built in the city. Public transport in Gothenburg is provided by buses, trams, trains and boats and the city has taken a number of measures to ensure that public transport is accessible for all. There is more easily accessible transit information and physical measures that make entering and exiting public transport easier. This example of Gothenburg will be beneficial because a number of

accessibility strategies implemented in the city could be applied to Christchurch during the earthquake rebuild.

In order to determine what makes a city accessible and resilient it is important to research case studies of cities showing poor accessibility and resilience. This research will complement this study because it helps to highlight certain economic, social, environmental and infrastructural aspects that Christchurch will not want to implement when rebuilding the city. Shanghai was rated 40<sup>th</sup> out of the 50 countries in the Grosvenor Study that looked into cities vulnerability, adaptive capacity and resilience. This poor resilience score is largely due to the rapid population growth in Shanghai of recent decades. This has meant that infrastructure and transportation systems have become very congested and overcrowding in the city has occurred (Barkham, et al., 2014). The overcrowding has had detrimental impacts to the environment in Shanghai with rivers and clean water sources being contaminated with sewage mixed with high levels of air pollution (Barkham, et al., 2014). The overcrowding in Shanghai has led to a massive decrease in connectivity and accessibility in the city. This research will be useful to this study because it has helped to show that the main reason for Shanghai having low resilience is because of its overcrowding. Overcrowded transportation and infrastructure will significantly reduce the accessibility within the city.

#### 4.5. Christchurch's Accessibility and Resilience

*Bourke et al [2017]* discusses how the severe lack of accessibility in Christchurch after the February 2011 earthquakes led to a massive decrease in the satisfaction of life for people living with disabilities. Their research also examines how disaster response plans are designed for able-bodied people leading to increased vulnerability for people with disabilities during the initial period after a disaster. The reasons behind this are all linked to accessibility issues, with disabled people struggling to access vital supplies and the community (Bourke, Hay-Smith, Snell, & Schluter, 2017). While in post-earthquake Christchurch, the inaccessible transport routes were an issue for everyone, this research showed that it was a major issue for people with disabilities because it isolated them from the community. Part of this studies definition of resilience includes a city's ability to; "recover from threats, stresses and fractures while maintaining its high levels of public

health and safety, economy and security.” This shows that in the short-term period after the Christchurch’s earthquakes, the city had a poor level of resilience, because it was unable to keep a high level of public health and safety as a result of inaccessible transport and infrastructure. This research will accommodate this project as it helps to show that there is still a number of gaps Christchurch needs to fill in order to become a highly resilient city. The accessible city model created in this research will be able to be applied to Christchurch to help prove that a higher level of accessibility in Christchurch will lead to greater resilience in the future.

At the end of 2013 Christchurch was one of the first 33 cities to join the Rockefeller 100 Resilient Cities Foundation (The Press, 2013). This foundation aims to: “help more cities build resilience to the physical, social, and economic challenges that are a growing part of the 21<sup>st</sup> century” (100 Resilient Cities, n.d.). Christchurch City is developing resilience plans through community engagement and grassroots participatory planning processes, including the ‘Share an Idea’ movement. The Share an Idea movement was a council driven community response project where the Christchurch community came together to discuss what they wanted from the central city rebuild following the February 2011 earthquake (Christchurch City Council, n.d.). Creating this sense of community resilience in Christchurch is seen as a key part of being better prepared to withstand future catastrophic events, such as the February 2011 Earthquake. Through the 100 Resilient Cities Foundation the Christchurch City Council adopted the Resilient Greater Christchurch Plan. Christchurch has adopted the idea that being resilient is not simply about building disaster resilient infrastructure, but also about creating resilience within individuals and communities (100 Resilient Cities, n.d.). This plan has four main strategies for community resilience which are; connect, participate, prosper and understand. Connect discusses the idea that connections between people and the place they live creates a sense of community and is an important part of resilience (100 Resilient Cities, n.d.). In Greater Christchurch, post-earthquake, there was not a high level of community resilience due to the relocation of households as a result of the destruction the earthquakes created. Creating community resilience is an important part of the Greater Christchurch rebuild and a key aspect of this is the connection between individuals within a community, or knowing your neighbours (100 Resilient Cities, n.d.). The next main strategy is “participate,” which involves individuals and communities contributing

to ideas and participating in decision making to create a resilient future. In Christchurch, this will be done by government agencies and councils allowing communities to drive change through active engagement and empowerment of individuals (100 Resilient Cities, n.d.). The final strategy of the Greater Christchurch Strategy is “understand,” this strategy discusses that the key to planning for future resilience within the region is to draw on and relate to other hazards we understand to help create a resilient approach to future disasters (100 resilient cities, n.d.).

On the 3<sup>rd</sup> November 2017, the Canterbury Accessibility Charter was launched, which is a Charter created by the Earthquake Disability Leadership Group and Barrier Free NZ Trust. The Charter envisions to make Canterbury the model of best practice accessibility through leadership, education and technical knowledge (Earthquake Disability Leadership Group, 2016). The Charter arose after the Share an Idea project which saw a key outcome being the desire for an accessible city. The desire for an increase in the minimum standards of accessibility will not only benefit individuals with disabilities but everybody. The charter envisions to make Canterbury the model of best practices accessibility not only in New Zealand but worldwide. A number of organisations around the Christchurch region signed up to the Charter to help assist with ensuring that all environs are accessible to Cantabrians and visitors to Canterbury equally. (Earthquake Disability Leadership Group, 2017) The outcome of the charter is that buildings in Christchurch will be universally accessible, predictable and safe that will benefit not only individuals with disabilities but other groups such as older people, people with temporary injuries and illness and those with young children. The overall aim of the Canterbury Accessibility Charter is to reduce the social isolation that individuals with disabilities face as a result of not being able to participate and engage in their communities. This is an example of a people-powered (bottom-up) initiative that has formed as a result of individuals taking power and creating change within their own communities. This is a form of community resilience as this charter will help to create a more accessible and resilient Christchurch through community actions. (Earthquake Disability Leadership Group, 2017)

Following the 2010 and 2011 earthquakes, the government declared that it will ensure people with disabilities are included in the earthquake recovery process to ensure accessibility of urban environment is considered and implemented. Christchurch is currently

in the ideal opportunity to make accessibility one of its primary design principles through universal design. Attempting to prove that accessibility will create a more resilient city is the main aim for this research and will hopefully provide more evidence that accessibility needs to be implemented during the rebuild. The International Covenant on Economic, Social and Cultural Rights also recommended to the New Zealand Government to seize the opportunity to apply accessible designs which will enable all individuals to participate in the urban environment on an equal basis. In July 2011, the Disability Action Plan was updated to ensure that people with disabilities were included in initiatives associated with the earthquake recovery. The main actions agreed upon were to redesign the disability support services and improve the accessibility of the built environment, including greater accessibility of public buildings, roads, footpaths and urban spaces (Campbell, 2017).

The “Goals for An Accessible City” was created by the local council to make “our central city easier for people to get to and move around in. Whether by bus, car, cycle or foot.” (Christchurch City Council, 2018) This plan was created as a result of community feedback from the 2011 Share and Idea Campaign that resulted in people wanting more green spaces, and pedestrian friendly areas in Christchurch as well as reducing the number of cars in the city. The vision of the Goals for An Accessible City Plan was to “enhance the social, environmental, and economic prosperity of the central city by sharing the streets and spaces differently” as well as providing “improved and well-connected walking, cycling and public transport facilities and routes.” (Christchurch City Council, 2018) One aspect of this plan that isn’t appealing to individuals with disabilities is that in order to create a more pedestrian friendly city centre the amount of on road carparks is going to be reduced. This has the potential to lead to increased accessibility issues for people with disabilities who rely heavily on private transport and mobility parks to access the central city. The benefit of reducing parking in central Christchurch is that it will make it easier for people, bikers and public transport to get to, from and around central Christchurch. (Christchurch City Council, 2018) This Accessible City Plan is an important part of this research that will potentially be discussed by interview participants to help determine whether or not accessible plans created by regeneration agencies post-earthquake have enabled Christchurch to become more accessible.

## 4.6. People with Disabilities

While accessibility and resilience are issues that affect everyone, individuals that experience a form of disability are exceptionally vulnerable to these issues. A fully inclusive society doesn't see people with disabilities as different or special because the environment allows everyone to live within it without any barriers (Human Rights Commission, 2012). Within New Zealand, disabled New Zealanders make up roughly 20% of the population, therefore providing universal access to the built environment is a fundamental human right so all individuals can participate fully in the urban environment. In New Zealand, there are two major pieces of legislation that apply to accessibility and the built environment, the Human Rights Act of 1993 and the Building Act of 2005, which provides for the New Zealand Building Code. The Human Rights Act makes it unlawful to deny an individual with disabilities access to a place or vehicle because of their disability. The Buildings Act is a regulatory framework and its purpose is to set standards to ensure that ensures buildings are designed to contribute to the health, independence and wellbeing of individuals who use them. More specifically Section 118 of the Building Act requires all new built public buildings to make reasonable and adequate provisions to enable disabled people to visit or work within them (Human Rights Commission, 2012). Also within the Building Act is the New Zealand Building Code, Clause D1 of this code discusses performance criteria relating to access and is known as New Zealand Standard 4121:2001 'Design for Access and Mobility – Buildings and Associated Facilities.' This is a compliance document that provides an acceptable solution to the functional requirements and performance criteria (Human Rights Commission, 2012).

A number of studies have shown the extent of accessibility of European cities for people with disabilities, especially those in wheelchairs. John Sage of Sage Travelling, has created a model for accessibility for wheel chair users for cities around Europe. Some of the key aspects that he uses to define accessibility include; smoothness of roads and sidewalks, flatness, proximity of sights to each other, accessible public transport and whether or not the city's population speaks English (Sage, 2015). While not all of these are relevant to the definition of accessibility used for this research there are some similarities that will be helpful in creating a model for accessible cities.



Accessibility is an issue that has major implications for individuals with disabilities. *The Human Rights Commission [n.d]* has outlined the main issues surrounding disabled peoples access to the built environment and these include; inconsistent application of the building code and building access standards, the lack of desire to make public spaces accessible, such as footpaths, roads, and parks, current building regulations and standards do not adequately cover the needs of blind and vision impaired individuals, accessible advertised hotels and motels often do not comply with minimum access standards, and disabled toilets being used for other purposes. With current building code requirements not meeting the needs of individuals with disabilities there has been call for improvements to the built environment accessibility standards (Disability and the Built Environment, n.d.). Universal design is an idea that has arose in recent decades and aims to create buildings that are accessible to all. Some of the key principles of universal design include: usable and accessible design to people of all diverse ages and abilities, minimising hazards and risks, entailing the least possible physical effort, and incorporating sufficient size and space to accommodate a range of mobility's, body postures and sizes (Disable people and the built environment).

*Campbell [2017]* researched the post-disaster recovery and reconstruction period, following a disaster, to determine how to create inclusive and accessible social, economic, environmental and built conditions for everyone in communities. When looking into the development of best practice for inclusive and accessible disaster reduction, readiness, response and recovery a new of themes emerged. These included; building back better and using disaster as an opportunity to enhance conditions for communities, participation and inclusion and making sure people with disabilities are included in emergency management and disaster risk reduction, recognizing the needs and capabilities of individuals with disabilities and including this in emergency management strategies and developing knowledge on New Zealand and international based research to ensure effective disability inclusive and accessible emergency management strategies are implemented (Campbell, 2017). This need for an increased awareness for post-disaster recovery for individuals with disabilities is supported by the *United Nations [2013]* who suggest that there is evidence proving that people with disabilities experience higher mortality rates during disasters compared to the rest of the population (Campbell, 2017). Increasing the accessibility of

information and communications as well as support services will help to decrease the vulnerability of people with disabilities in post-disaster situations.

## 5. Research Questions

- 1) How are accessibility and resilience connected? Does high levels of accessibility lead to a more resilient and resilient city and vice versa?
- 2) What are the key aspects of an accessible and/or resilient city? E.g. Accessible transportation links and infrastructure
- 3) Can accessibility make Christchurch more resilient to future shocks and stresses that the city will face? If so, how?

## 6. Methodology

The methodology of this research will be broken into two main parts; a literature review, and a qualitative interview process. The literature review is the basis of the information in this study and will provide vital background information on the connection between accessibility and resilience. Interviews will be an important part of this research because there is limited previous research available, meaning first hand views and opinions will be important. *Timothy Rapley [2011]* gives justification for using interviews as part of qualitative research stating: “interviewing is the central resource through which contemporary social science (and society) engages with issues that concern it” (Rapley, 2011). The interview data collected from these interviews will be seen as a ‘topic’ meaning that: “the interview data collected are seen as (more or less) reflecting a reality jointly constructed by the interviewee and the interviewer” (Rapley, 2011) Input and knowledge from individuals who are either in the professional sector or have experience in urban resilience and accessibility will be important to form a greater knowledge of how these two notions interact.

### 6.1. Literature Review

Research will be undertaken looking at local and international sources surrounding the connection between accessibility and resilience. While there is little research connecting accessibility and resilience there is a large amount of research about resilience and accessibility separately. The first step of this research analysis will be to do a thorough analysis on previous research outlining the relationship between resilience and accessibility. Since there isn’t a lot of current research detailing this relationship, research will then be undertaken on studies looking into resilience and accessibility separately. These studies will then be cross referenced to try and help gain a more detailed knowledge of the link between accessibility and resilience.

Case studies of cities that have low and high levels of accessibility will be undertaken to find a connection between these cities and their levels of resilience. For the purpose of this

study Vancouver and Gothenburg will be studied in depth since they are cities that highly believe accessibility is an integral part of an urban environment. These international examples will be further examined in section 4.4 of this research. These case studies were decided upon because they frequently appear in literature discussing accessible and resilient cities. This includes Vancouver being shown as a resilient city in the Grosvenor report outlining the most resilient cities worldwide. Inaccessible cities tend to be those that were built a long time ago and haven't been updated to preserve their heritage. This has resulted in these cities being largely inaccessible due to their poorly constructed transport routes. For the purpose of this study Shanghai will be used as an example of a city that has low levels of accessibility. These international examples of accessible and inaccessible cities will be helpful in detailing what these cities have done to increase their accessibility. A thorough analysis of aspects Christchurch's built environment that show high and low levels of accessibility will also be done, this will be to help analyse the resilience of Christchurch. Examples of accessible and inaccessible places and spaces will be developed during the interview stages of this research. The aspects of the built environment that this research will focus on will be; transportation systems (walking, biking, private and public transport) and public infrastructure. While private housing is another aspect of the built environment this research will not take this into account.

*Creswell [2009]* discusses how the literature review is a successful research method to accomplish these include; sharing results of other studies that are closely related to the study being undertaken, filling gaps and extending prior studies, establishing the importance of the research and comparing results with other findings (Creswell, 2009). There are a number of the reasons why I decided to complete a literature review as part of this research, mainly because the literature review is essentially the foundation for a number of qualitative studies. The types of documents used in this literature review include; journal articles, books, governmental documents and strategies, council reports, etc and as *Creswell [2009]* explains these types of documents "represents data which are thoughtful in that participants have given attention to compiling them."

The types of data used in this literature review have been carefully considered to allow for a broad range of ideas and opinions to avoid bias in this study. When finding relevant research online I mostly used the University of Canterbury library website, however I did

also use Google Scholar, Factiva and UC Geography databases. Search terms used were based around accessibility, resilience and people with disabilities. Searching for relevant accessibility papers was challenging because accessibility has many different definitions to different people and groups. To counteract that search terms surrounding accessibility included 'urban accessibility,' 'accessibility for people with disabilities,' and 'the accessible journey.' Resilience was more straight forward to find relevant articles by using terms such as 'urban resilience,' 'social resilience,' community resilience,' and 'environmental resilience.'

## 6.2. Interviews

All individuals interviewed in this study are professional stakeholders, some of whom are advocates for accessibility who have disabilities. Professionals selected for this research will have either a technical background in accessibility or resilience, and may or may not exhibit a physical mobility disability. These physical mobility disabilities include, but are not restricted to wheelchair users and vision impaired individuals. Professionals that don't have experience in these sectors will be excluded from the interview process. Professional occupations that can be part of the interview process will include, urban and transport planners, accessibility consultants, and local and regional government officials. Professionals may also include lecturers who work in the field of accessibility and resilience, and disability service staff from the University of Canterbury. Interview participants were selected from a number of different methods either knew the individual personally, through this researcher's time at the EDLG, and reached out to them via email or phone to set up an interview or a third party was used to recommend potential participants for interviews. These third parties included the community partner, the Earthquake Disability Leadership Group, who recommended individuals to get in touch with who would potentially be interested in being interviewed. They helped this researcher get in touch with individuals by connecting the researchers and the participants either in person via phone or via email. Seven interview participants were recruited to be part of the interview stage for this research, ranging from a number of local organisations within Christchurch. A number of the interview participants also exhibited a physical mobility disability themselves or have a

personal relationship with an individual with a physical mobility disability. Appendix 1 outlines the interview questions used during the interview process.

These interviews were semi-structured and questions were asked based on a number of themes, including:

1. Defining accessibility and resilience
2. Aspects of resilient and accessible cities
3. Examples of personal issues with accessibility
4. Discussion based on accessibility of Christchurch before the rebuild and now
5. Finding a connection between accessibility and resilience
6. Discussing whether or not Christchurch is universally inclusive

Each interview was driven by the participants' willingness and ability to discuss each of these themes. Individuals with a more technical background provided a more in-depth knowledge on accessibility and resilience. While, individuals without a technical background drew ideas more from their own personal experience with accessibility and resilience. Participants in these interviews were made to sign a consent form, which allows this researcher to use their answers in this research while keeping all discussions with individuals confidential.

*Creswell [2009]* discusses the different types of data collection methods for qualitative research. He describes how interviews are useful as participants can provide their point of view as well as providing historical information on a research topic (Creswell, 2009). However, as Creswell explains, interviewees responses may be bias and the views of the individuals could sway the results of this research. To account for this I have prepared interview questions to try remove any bias from interviewee's answers. This will be done by creating questions that don't force the participants into giving me answers that I want from questions and instead allow them to speak about their own opinion on the topic. For further information on the interview schedule refer to appendix 1 for the full list of questions used. *Creswell [2009]* also discusses how qualitative research interviews usually are made up of open-ended questions to try and find out the views and opinions of the participant. The interview structure has been made up to align with this idea with all of the questions within the interview schedule being opened ended to allow for discussion.

### 6.3. Methods of Analysis

The main method of analysis for the information gathered during the interview stage of this research was a thematic analysis. This was done by pulling main themes out the interview transcripts to determine commonalities in the findings. The themes were broken into three main headings, accessibility, resilience and universal inclusiveness, these were the three main topics discussed during the interviews. The thematic analysis was an important part of this research because it helped to show the interview participants opinions to the research questions of this study.

Some of the common themes analysed were:

- 1) Opinions of accessibility and resilience
- 2) Aspects of accessible and resilient cities
- 3) Awareness of accessibility and resilience issues in Christchurch
- 4) Accessibility and resilience levels of Christchurch
- 5) Things that can be done to make Christchurch more accessible and resilient
- 6) The level of Christchurch's universal inclusiveness

These main themes discovered when then used as topics for the results and discussion sections as part of this research. It is believed that the themes that were analysed during this research were to most suited to best answer the underlying research questions. This analysed data was then compared to data collected from the literature review to collate the two sets of information to create the discussion section. Similarities and differences between the literature review and interviews were examined.



## 7. Results

### 7.1. Accessibility

#### 7.1.1. *Opinions on Accessibility*

The definitions of accessibility given by the interview participants can be seen in the table 1 below. While the definition of accessibility changed slightly depending on participant however there were some common themes that arose. All of the participants agreed that accessibility was about equal access to infrastructure and spaces to everyone depending on whether they had a disability or not. While some participants restricted their definition of accessibility to the built environment some extended this view to access to the community. One interview even explained that they believed

“accessibility comes under four headings, accessibility to physical spaces, to services, to information and to employment.”

They also explained how a lot of focus was on access to the physical environment and a lot of the time accessibility to services, information and employment were forgotten about. However, an accessible physical environment does facilitate access to services, information and employment. While access to services, information and employment are very important, access to the physical environment is a prerequisite to accessing these aspects of society. Social access was another aspect of accessibility a number of the interviewees discussed. This was explained as the access to the community and individuals and one interviewee believed that “physical access is a prerequisite to social access.” This means that without access to a building, public space, etc there is no chance to have social interactions. All of the interviewees also agreed that accessibility is an issue that affect the whole population, not just individuals with disabilities.

Table 1: Definitions of Accessibility

Accessibility	Interviewee A	“opportunities to make sure everyone can participate in our city and the city life.”
	Interviewee B	“physical access is a prerequisite to social access, if you can’t get in or can’t get there, the door [for interaction] is shut early.”
	Interviewee C	“the degree to which the built environment allows people to carry out normal activities in society.”
	Interviewee D	“equal access for everyone regardless of their abilities.”
	Interviewee E	“being able to participate in society with ideally no barriers but certainly as fewer barriers as possible.”
	Interviewee F	“to make access to buildings and facilities easier for anyone with any form of a disability, whether it be by age or injury.”
	Interviewee G	“accessibility is about all people being able to get into, around, and out of all places and spaces independently and with ease.”

### 7.1.2. What Makes a City Accessible?

When asked what makes a city accessible the interviewees all had different opinions however one common theme arose from a number of interviews which was enforcing best practice accessibility over minimum standards. A few of the interviewees also agreed that to enforce best practice accessibility you have to change the mind-set of city planners, builders, architects, and so on.

“Universal design and best practice would be great rather than minimum needs. So somehow getting that changed so builders, resource consent people, planners, all start thinking best practice rather than basic minimum.”

One interviewee explained how they believed that to create a change in mind-set about accessible design, you first have to find a way to normalise accessibility. This interviewee believes that is because “we think people with disabilities are such an exception.” If society can normalise accessibility it should become something that is the norm rather than a great

exception meaning that everyone will be able to engage with the urban environment equally.

“there are probably different ways of normalising accessibility so it isn’t something accessible, it is just something we do so everyone can engage with this place.”

The idea of the accessible journey was brought up during a few of the interviews. This is the idea that accessibility isn’t just about getting in the front door rather “approachability, accessibility and usability.” This journey encompasses all aspects of accessibility including, can people with disabilities approach a building or space, can they get to a building or space, can they get into it if required and then once inside a building or space can they participate once they are inside. While most interviewees agreed that accessibility within a building or space is just as important as accessibility outside any building or space, there were a few who only discussed the importance of accessible entrances in creating an accessible environment. There was also the belief by some interviewees that creating accessible environments was about making them accessible for wheelchair users and not the greater disability sector. One interviewee explained how the needs of individuals with vision impairments haven’t been included into building upgrades. However, they didn’t “know why that hasn’t been a factor ever.”

One interviewee believed that “the most important thing is really good strategic directions from all of the agencies involved.” This interviewee explained how this meant that for something to be fully accessible and inclusive it has to be thought about right at the very beginning and has to be the criteria for any project or development. A number of interviewees also discussed how integrating accessibility into policies for designing cities will lead to accessibility becoming part of the planning process.

### *7.1.3. Awareness of Accessibility Issues in Christchurch*

A number of topics were brought up by the interview participants when talking about current accessibility issues in Christchurch including, the aging population, promoting accessibility, inaccessible public spaces and making people aware that accessibility is an issue that effects everyone. A few of the interviewees explained how Christchurch’s aging

population is creating accessibility issues. This is due to the fact that older individuals require a higher level of accessibility and this means that “we should be better prepared as our population ages.” Another topic that arose during multiple interviews was the issue of depicting accessible design in Christchurch. With a number of new accessible buildings and spaces being created in Christchurch, this has led to the need to promote the accessibility of these spaces. However, as interview participants have mentioned, there is a lack of knowledge of how to promote accessibility without making it seem demeaning to individuals with disabilities. An interviewee explained how they believed the best way to promote accessibility was through portraying “diversity in all depictions.” By doing this it could mean that accessible depictions become “the new standard.” Another interviewee also elaborated on the idea of depicting accessibility by saying everyone wants an inclusive and accessible environment however not many people understand how to depict an accessible environment correctly. Stating

“the devil is in the detail of what does accessibility look like? People have different opinions on what accessibility looks like, therefore how do you build for accessibility?”

Another issue, according to one interview participant, is that there are still a lot of people in Christchurch who don’t understand why they should care about accessibility because they don’t understand why accessibility matters to them. This interviewee discusses how people are motivated by doing something for a reason and “unless there is a positive outcome people tend not to do it.”

“One thing you are always up against when talking about accessibility is why does it matter to me? And that is what motivates people, doing something for a reason.”

This research has uncovered that abled-bodied individuals have a level of accessibility that suits their design. As one interviewee mentioned, without a stair case an abled-bodied individual would not be able to access certain parts of a building. This is a good example to show that accessibility is an issue that effects everybody, and is a good way to help normalise accessibility.

“Able-bodied people have a level of accessibility that suits their condition, you know able-bodied people can go upstairs but if there wasn’t the stairs there to go up they wouldn’t be able to access it.”

The final topic discussed surrounding accessibility issues in Christchurch was the need for more accessible public places. An interviewee explains how they would have liked to have seen a lot more work into making these public spaces more accessible to a wider range of people. However, they were aware that the poor accessibility at a lot of public places in Christchurch was a result of the rush created post-earthquake to get these spaces built.

#### *7.1.4. Christchurch’s Accessibility*

When asked whether or not the interviewees believed Christchurch was an accessible city, none of the participants believed that the city is truly accessible. Three of the interview participants agreed that while Christchurch isn’t accessible presently, there are things that can be done to make the city more accessible in the future.

“[In Christchurch] the earthquakes have made that [accessibility] so much more difficult. One of the ways I’ve described people with disabilities after the earthquakes is that their lives got much smaller.”

One interviewee discussed that while there are still things that can be done to make Christchurch more accessible in the future, as a city we have missed our chance to create a truly accessible environment. This is because accessibility had to be thought of in the early stages of the rebuild and not as an afterthought.

“Some probably can’t be fixed, some of the bits that have already been done can’t be fixed. In some ways we have missed the boat in terms of chances post-earthquake.”

One interviewee believed that Christchurch wasn’t accessible before the earthquakes and while accessibility in post-earthquake Christchurch isn’t great this interviewee believes that accessibility “is going to be better than what it was.”

The best response received regarding Christchurch's accessibility was from an interviewee who stated

“the city had a reasonably good level of accessibility, compared to the national average, before the earthquakes. The earthquakes then created an opportunity to make that even better and take it a step further to become a world leader in accessibility.”

However, this interviewee also understands that accessibility in Christchurch presently isn't where they would like it to be but is aware that high levels of accessibility “is never going to happen overnight, that requires a lot of changes.” The speed of the rebuild has also created a number of areas of “temporary” inaccessibility, especially within the central city. A number of these areas can be linked to the inaccessibility created by the reduced car parks in the CBD mixed with the construction obstacles around the city.

Two interviewees discussed how in Christchurch we have a number of opportunities to make the city accessible, thus an interesting question posed is how can the city still not be accessible with all of the opportunities given post-earthquake?

“There is just no excuse for that [inaccessibility], it is so easy and we have so many opportunities to make sure everyone can participate in our city and city life and that's kind of the heart of the matter.”

According to one interviewee, another way to create a more accessible Christchurch is to create a sense of acceptance within the city. “Changing acceptance is about communication, education and teaching people why it [accessibility] is good for the city.” This interviewee also explained how they were aware of workshops within Christchurch to try and promote accessibility within the CBD. This interviewee also discussed how acceptance is already growing within Christchurch surrounding accessibility. The next step, according to this interviewee, is to produce hard facts to try and change individual's acceptance of accessibility because “the facts help people understand... once you can wrap stats around what you are trying to talk about and get hard facts you start to get good acceptance.”

#### *7.1.5. What more can be done to Make Christchurch Accessible?*

One interviewee discussed how they liked the idea of barrier free audits to help create a more accessible Christchurch. Barrier free audits are designed to help create an accessible environment by giving organisations guidance on how to best implement accessibility by removing barriers to access. However, there is a flaw with this concept and this was shown through an example given by an interviewee of a café in Christchurch central where:

“the final decision wasn’t a person who had consulted with the person who had done the barrier free audit and there were some real challenges with that building as a result, especially for people who are vision impaired.”

This is a good example to show that while barrier free audits could be a good idea to create a more accessible city, it needs to be implemented correctly. This interviewee explained how barrier free audits have previously been attempted in Christchurch but weren’t implemented correctly. If barrier free audits are going to be utilized in Christchurch then it is important to make sure that the outcome of the audits are implemented to create universally accessible infrastructure.

Another interviewee discussed how accessibility to employment for people with disabilities is very important in creating a more accessible Christchurch. This interview participant discussed how while unemployment rates in Christchurch are low, this “isn’t proportionally low for the disability sector because a lot of jobs created aren’t readily accessible to people with disabilities.” A large amount of jobs created as a result of the rebuild aren’t readily accessible to individuals with disabilities because work sites and types of work are inaccessible to them. They also discussed how having people with disabilities working in jobs that can influence the rebuild process would lead to accessibility not being discussed as an afterthought.

“The best way to increase awareness and informing people about accessibility is [people with disabilities] being amongst them, being their colleagues, being with them at a social activity, being out there doing is the best way of informing and making more people aware.”

Another idea to create a more accessible Christchurch is to educate and inform individuals, corporations and governmental agencies on how to create accessible environments. According to a number of interviewee's, a gap has been created in that most people want to create accessible environments but don't know how to. An example of this discussed with four of the interviewees was the local council's accessible city plan. A number of the interviewee's either felt the plan was "confusing" or didn't "fully grasp the idea of accessibility." This comes back to the idea that people have different opinions of what accessibility looks like. An interviewee discussed how being able to create a universal term for accessibility would help create a general consensus on how to design accessibility. However, an interviewee did believe this plan was helping to create a more accessible city by "creating mobility, around Christchurch, for people with disabilities." Another interviewee explained how they believed this accessible city plan was created to promote business in the central city rather than creating accessibility. "The underlying ideal with that document is that we want it this way so that commercial businesses can prosper."

#### *7.1.6. Poorly Accessible Locations in Christchurch*

Another topic of discussion during the interviews conducted was locations in Christchurch where accessibility was lacking, or not present all together. This topic is important for this research because it provides case studies showing that accessibility is still an issue in Christchurch. A number of interview participants came up with a number of different locations, however a few were mentioned during a number of interviews. These locations were, the Christchurch Earthquake Memorial, the St Asaph Street cycle lane, and the Margaret Mahy Playground. When asked an area they believed in Christchurch to be in accessible two of the seven interviewees responded with the earthquake memorial. One interviewee responded that while the earthquake memorial is "technically accessible... it would definitely be far shy from best practice accessibility." They discussed how the entrance ramp was too steep, making accessibility challenging for wheelchair users, and it doesn't have adequate railing, for vision impaired individuals. The second participant discussed how the earthquake memorial was another example of "form over function" and while the earthquake memorial looks spectacular it "isn't accessible or inclusive." The



second interview participant agreed that the entrance ramp was too steep for individual with mobility issues and further explain that people with physical mobility disabilities struggle to distinguish between the ground and the neighbouring river, especially when conditions were wet. It was explained that the earthquake memorial is a good example of accessibility being implemented as an afterthought. As a result of this is isn't as accessible and inclusive as it could have been if it was thought of in the design stages. Figure 5 shows images of some of the accessibility issues at the Canterbury earthquake memorial. The left image shows the lack of handrails and the lack of colour difference between the ground and the river while the right image shows the lack of access for individuals is wheelchairs.

“Accessibility here is an afterthought, it has been added to the design and it isn't as accessible and inclusive as it could have been.”



*Figure 5: Images of the Canterbury Earthquake Memorial*

Two of the seven interviewees also discussed how the Margaret Mahy Playground was an example of an inaccessible location in Christchurch to individuals with physical mobility disabilities and children with autism. Once again it was believed that, because of the low

levels of accessibility, accessibility was an afterthought in the design of this playground. One interviewee discussed how the Margaret Mahy Playground doesn't have anything for children with the highest levels of disabilities. Figure 6 and 7 below show some of the accessibility issues at the playground. Figure 6 shows an area inaccessible to individuals with wheelchairs while figure 7 gives an overview of the playground. One of the participants also gave the example of how the Margaret Mahy Playground doesn't have an accessibility swing present, so therefore it isn't fully inclusive and accessible. A number of other issues to accessibility including narrow paths, poor colour perception and the lack of quiet spaces were also discussed during these interviews. With one interviewee stated that all of these issues

“show me that the accessibility thinking was not built in from the beginning despite all the reassurances.”



*Figure 6: Accessibility Issues at the Margaret Mahy Playground*





*Figure 7: Margaret Mahy Playground*

The last example of an area that creates accessibility issues in Christchurch is the St Asaph Street cycle lane. Both interviewees explained that while the cycle lanes are a good thing for Christchurch, they haven't been implemented correctly which has led to accessibility issues for people with disabilities. One of the interview participants explained how they believed these barriers were caused around the cycle lanes because there was a lack of communication with a diverse group of individuals. This has led to a number of obstacles for people with disabilities including curbs on either side of the cycle lanes which is a barrier for people with mobility disabilities. Both interview participants believed that while it is a good thing that these cycle lanes create protection for cyclists, one of the participants believed pedestrians' safety should be prioritised over cyclists. Figure 8 below shows the barriers created to individuals with disabilities by the new St Asaph Street cycle lane.



*Figure 8: St Asaph Street Cycle Lane (Cycling in Christchurch, 2016)*

## 7.2. Resilience

### 7.2.1. Opinions on Resilience

The definitions of resilience given by interviewee participants can be seen in table 2 below, once again the definitions provided by each interviewee differed slightly. The majority of interviewees had the same belief that resilience is about being able to prepare for, respond to, and recover from a disaster or event, or urban resilience. Two of the seven interview participants discussed community resilience, they believed that for a city to be resilient the communities within that city had to be resilient also. One interviewee stated;

“people are resilient because they supported by each other, well connected and feel a sense of belonging and trust.”

A number of interview participants also expressed their belief, that in Christchurch, people who are still dealing with unresolved earthquake insurance claims don’t feel resilient because they have lost trust in these organisations. With one interviewee also discussing how constantly fighting with these organisations wears down an individual’s personal resilience.

“this is a huge gash in our sense of resilience... that so many people in these groups continue to languish should signal to use that there is work to do to build the kind of resilience that everyone can be part of.”

*Table 2: Definition of Resilience*

<b>Resilience</b>	<b>Interviewee A</b>	“resilience means two things (1) in terms of the built environment you want something that is going to last, something that seems safe... the most important part is (2) people.”
	<b>Interviewee B</b>	“we plan ahead to the extent possible so that people’s wellbeing is minimally harmed or even improved.”
	<b>Interviewee C</b>	““when you are not in normal times, when something happens, that society can continue to function as much as normal without undue hardships or stresses... the ability to bounce back.”
	<b>Interviewee E</b>	“is the ability to bounce back from mishaps, from challenges, from setbacks in life.”
	<b>Interviewee F</b>	“to improve on what we have initially got, moving forward with time and accepting the fact that we have to change.”
	<b>Interviewee G</b>	“resilience is how a community can respond to and recover and take opportunities given through an emergency event.”

### *7.2.2. What Makes a City Resilient?*

After asking interviewees what they believed made a city resilient it became clear that each individual had a different take on this topic. Whilst their answers were all slightly different they all came under two main themes, resilient communities and resilient infrastructure. Resilient infrastructure includes having safe spaces that can withstand disasters and events. Having resilient infrastructure can remove mental barriers to resilience that a number of individuals face, especially in post-disaster cities. Mental barriers occur when people are less adventurous and willing to take risks. When discussing resilient infrastructure one interviewee discuss how

“in terms of the built environment you want something that is going to last, something that seems safe, designs that will last the test of time.”

Another interviewee discussed how in order for a city and its infrastructure to be resilient it needs to be a place where people want to be all the time.

“it has a pulse, has a life of its own, is a place where people want to be and are happy to be and want to be around 24/7.”

Another interviewee explained how to have resilient infrastructure, it needs to be universally inclusive.

“To be resilient you have to have this inclusion for everybody and if you don’t have it and you have this event [earthquake] like we had, you should be taking every opportunity to make sure it happens.”

Interviewees also had different perspectives on what it took for communities within a city to be resilient. These include; having a physically and mentally fit population, having fun, communities having experience of disasters and being resilient, and seeing progress during the rebuild of any major event. One interviewee discussed how having a population that is as healthy as possible will “help people cope and built positive vibes.” Another interviewee also discussed how fun is an important part of community resilience and creating places, like the Margaret Mahy Playground are important because;

“in the progress of the rebuild it was a place you could go and be social and see people having fun and participate to the extent you want to participate.”

For community resilience one interviewee participant discussed how they believe that living experience of being through a disaster, such as in Christchurch, create more resilient communities and cities.

“I think the experience most people in communities have had has taught them to manage situations better than most places in the country. There would be less shock if something bad happened and we would manage to and support each other better.”



Two interview participants discussed how seeing the progress of the rebuild after any disaster is important for a communities and city resilience. This is because they believe no one can keep being resilient forever, but believe that progression helps people carry on being resilient. An idea was also developed that people want to recover and become resilient together, however this sense of community resilience does tend to taper off over time.

“Resilience is also about people seeing some progress as well, not banging your head against a brick wall with nothing happening.”

### *7.2.3. Awareness of Issues Surrounding Resilience in Christchurch*

One of the main issues that was discussed during the interviews surrounding resilience issues in Christchurch is the mental health issues that arise from people becoming tired of being resilient. One interviewee expressed how “people can only keep being resilient and fighting battles until enough is enough.” The same interviewee believes that a number of the more vulnerable groups in Christchurch, including people with disabilities, and less well-off individuals have seen an increased percentage of mental health issues as a result of the earthquakes. This leads to people becoming and “tired and worn down” and has a big impact on individual and community resilience.

More positively a number of interview participants discussed how they have seen an increased sense of community resilience in Christchurch post-earthquake. However, recently there has been a decline in community resilience and as one interviewee explained, time has had a major impact on our community resilience as we transition back to normal.

“Time has an impact on that [community resilience] and we may only have the benefit of that for another ten to twenty years but once enough time has passed you do lose that with new people moving in and new generations becoming adults.”

#### *7.2.4. Is Christchurch a Resilient City?*

Interview participants had varied responses when discussing whether or not they believed that Christchurch was a resilient city. Three of the interviewees believed that the levels of resilience in post-earthquake Christchurch was dependent on an individual's socio-economic state. It was expressed that the resilience of mentally and physically fit individuals tended to be higher than those who were either people with low incomes, with disabilities, living on the east side of the city and those with unresolved earthquake insurance claims. One interviewee also discussed how there is a "buzz that we are more resilient" in Christchurch because of the experiences we have had. However, there is evidence that suggests people with disabilities are yet to have attained their pre-earthquake levels of wellbeing. Another interview participant discussed how dealing with earthquake insurance claims has taken a toll on individual's capacity to be resilient in Christchurch.

Another interviewee mentioned how they believe that an individual's interpretations of Christchurch depends on what resilience means to them.

"It depends on what you think of resilience, for me resilience depends on the opportunities given to you to make it better and for me we haven't don't that... that opportunities to rebuild our city haven't been taken."

Another interviewee believed that Christchurch is "reasonably resilient," however they go on to explain that they believe our resilience would be determined by what future events occur.

"If there was a pandemic I don't think we would be that resilient but if there was another earthquake I think we would be really resilient."

This interviewee's point of view is based around the belief that experience leads to increased resilience and since we have experienced a catastrophic earthquake we will be better prepared and more resilient to another. This is because this interviewee believes if we had another earthquake our experience from the previous earthquake would mean that we would click straight back into post-earthquake mode.



#### *7.2.5. Will Higher Levels of Accessibility Lead to a More Resilient Christchurch?*

When asked whether or not having higher levels of accessibility will help create a more resilient Christchurch, six of the seven interviewees believed that this is definitely the case. Generally, it was believed that creating a more universally accessible city would lead to increased resilience because without accessibility the whole population cannot be resilient.

“I believe it [accessibility] contributes, on its own it won’t.”

“To me accessibility is a very complex topic and for me because accessibility is an enabler of so many other good things that we want, the more accessible anything is the more resilient it would be. Hence the connection for me, one allows things to happen that might not have happened otherwise. We want accessibility because we want resilience.”

One of the main ideas linking accessibility and resilience that was discussed during a few interviews was the idea that accessibility leads to inclusions and without an inclusive society you can’t be resilient. The idea of inclusion wasn’t an aspect greatly considered at the start of this research, however the interview stage really brought out the importance of inclusion in creating resilience. One interviewee stated; “To be resilient you have to have this inclusion for everybody.” With another interview participant discussing:

“if your whole city isn’t included how are you a resilient city? If you aren’t including the whole population?.... Accessibility is a means to an end, accessibility is a means to getting inclusion so if you don’t have inclusion how do you have resilience? Cause you leaving out half of the population.”

One interviewee discussed the idea that in a disaster situation, resilience is easier to maintain with an increased level of accessibility. Another interviewee discussed how in an emergency situation it is easier for individuals with disabilities to be resilient with increased accessibility because if you are more reliant on others to help you during an emergency situation your individual resilience is significantly decreased. This is an important aspect linking the ideas of accessibility and resilience together being that, more accessible buildings make it easier for individuals with disabilities to be more resilient in times of disaster.

“Certainly, I think if it more accessible in the first place it means there is less disruption to people’s ongoing life when a natural disaster does happen. Therefore, resilience is easier to maintain.”

### 7.3. Universal Inclusion

#### *7.3.1. Is Christchurch a Universally Inclusive City?*

Four of the interview participants had negative views on the universal inclusiveness of Christchurch at present day. With another interviewee discussing that while it is not overly universally inclusive right now it will definitely be more inclusive in the future. This negative attitude towards Christchurch’s universal inclusiveness largely stemmed for the fact that a number of interviewees believed that not enough has been done for people with disabilities during Christchurch’s rebuild. Table 3 below gives an overview of the opinions held by interview participants about individuals with disabilities related to accessibility and resilience.

One interviewee posed the question

“what can we do in the new Christchurch to make it easier for people with disabilities to be spontaneous?”

This is around the idea that in order for a city to be universally inclusive it needs to allow people with disabilities to be spontaneous. Something that this interviewee believed has yet to be discussed in the rebuild and is the reason why Christchurch isn’t a universally inclusive city yet. Another interviewee also believed that in order for Christchurch to be universally inclusive it needed to allow people with disabilities to be spontaneous. Stating that they believe individuals with disability should be able to be spontaneous in their private and work life and that is what will make Christchurch more universally inclusive. An interviewee participant discussed how they knew a workspace in Christchurch that had to change venues where meetings were held if an individual with a physical mobility disability wanted to attend meetings. This was because meeting floors at this workspace were on the second

floor and the only way to get up there was up a staircase. The interviewee explains this workspace in more detail below;

“[There is] a big meeting room on the second floor but it’s a repurposed tire warehouse and doesn’t have an elevator so if someone with an accessibility need is going to attend then they will have to go to other venues that accommodate that.”

The belief that Christchurch can be a universally inclusive city in the future is a view that was shared amongst the majority of the interview participants. Two of the interview participants agreed that Christchurch should be a universally inclusive city because its geography and design nature allows for an accessible city. They agreed that with Christchurch being a flat, spread out, and grid natured it should be highly universally inclusive and this is why “we have a slightly larger proportion of people with disabilities living here.”

“I think it [Christchurch] has the potential to be [universally inclusive] because it is flat and has a grid nature, it could be really accessible for everyone.”

*Table 3: Interview Participants view on People with Disabilities*

<i>Disability</i>	<b>Interviewee</b>	
	<b>A</b>	
	<b>Interviewee B</b>	“people’s [with disabilities] lives got a lot smaller after the earthquakes.”
	<b>Interviewee C</b>	“when disasters happen people with disabilities go to the back of your mind.”
	<b>Interviewee D</b>	“you are looking at preventing further harm and responding to people in need rather than looking at the need of someone with a disability.”
	<b>Interviewee E</b>	“the non-disabled population think of the disabled population as a group who are pretty much the same, but the disability sector is a large group of smaller groups who all have different needs depending on what that disability is.”
	<b>Interviewee F</b>	“nowadays society is expected to try and adapt [people with disabilities] back into the system.”
	<b>Interviewee G</b>	“for people with disabilities life is already on a cliff hanger, daily life was complex, and then in an emergency it just puts that over the edge.”

“we are lucky because our geography here allows our city to be accessible and it is the perfect place to create an accessible city.”

According to an interview participant abled-bodied individual's perspective on people with disabilities has an impact on Christchurch becoming a truly inclusive city.

“The non-disabled population think of the disabled population as a group who are pretty much the same, but the disability sector is a large group of smaller groups who all have different needs depending on what that disability is.”

This means that frequently designers attempt to create a universally inclusive city but don't correctly factor in accessibility because they don't understand that there are a number of disability groups who all have different requirements to meet their needs.

## 8. Discussion

### 8.1. What are the Key Aspects of an Accessible and/or Resilient City? E.g. Accessible Transportation Links, Infrastructure and Communities

In making a city resilient it became obvious in this research that not only infrastructure resilience was important but the resilience of communities and individuals was equally so. However, it was also discovered that whilst social and infrastructure resilience are both aspects of making a city resilient, social resilience is facilitated by have infrastructural resilience and accessibility. This idea arose during the interview stage of this research and can be confirmed by previous literature on the topic. Infrastructural resilience has been explained by *the United Nations Office for Disaster Risk Reduction* as creating more resilient infrastructure to disasters, this includes buildings, transportation routes and services and utilities. This belief was also shared with a number of interviewee's, one of whom explained how with city infrastructure you want something that is safe, and will last the test of time. An interviewee also discussed how they believed "in terms of the built environment you want something that is going to last, something that seems safe, designs that will last the test of time." Resilient infrastructure is important for creating a resilient city because it facilitates community and individual resilience.

Resilient communities are another main aspect of creating a resilient city and *Jha et al [2011]* define this as resilience through community participation to climate change and future disasters. *Campbell [2017]* also discusses how enhancing community resilience is a significant factor in effectively preparing for, responding to and recovering from disasters. This belief has also been supplemented by the interview participants who explained what they believed helped communities be resilient in a post-disaster situation. These included, having a physically and mentally fit population, having fun, communities having experience of disasters, and seeing progress during the rebuild of any major event. One interviewee elaborated on community resilience discussing how "people are resilient because they are supported by each other and well connected and feel a sense of belonging and trust." During the interview process it became clear that the interviewees shared the idea that decreased community resilience was related to reduced accessibility. This connection is

further discussed in section 8.2 of this research. Through this research it has become clear that both infrastructural and community resilient are integral aspects of making a city resilient. This is important because a lot of focus tends to be put on the resilience of infrastructure when preparing for disasters. However, this research has discovered that creating resilient communities will lead to a more resilient city during times of disaster.

Deciphering what aspects cities need to be accessible was another part of this research. Literature by *The Office of the United Nations High Commissioner for Human Rights [n.d.]* suggested that there were three main aspects in making a city accessible and these were, reducing the use of cars to promote the use of public transport, cycling and walking, providing housing close to everyday destinations, such as shops and work places, and providing spaces and facilities that are safe and accessible to users of all ages and abilities. Interviewee's agreed to a degree with this idea with a number stating that "universal design and best practice" are the standards needed for creating accessible spaces and facilities, and providing nearby accommodation to everyday facilities will be beneficial to individuals with disabilities. However, reducing dependency on vehicles wasn't seen as beneficial to increasing accessibility by several interview participants. This is because it would create barriers to everyday life for individuals with disabilities since for many people with disabilities private transport is their only option for them.

The idea of the Accessible Journey is important in creating a universally accessible city. As one interviewee explained the accessible journey doesn't just account for getting into a building, it accounts for the whole journey from destination A to B. More complexly another interviewee explained how this idea considers "approachability, accessibility and usability." Meaning how easy it is for an individual with disabilities to approach a place or space, how easy it is to access this place or space and the ease with which an individual with disabilities can use the place or space when inside. The *Human Rights Commission [2005]* also explained the importance of the accessible journey describing it as quoted below.

"the accessible journey covers all the steps needed for a person to get from their home to their destination and return. All steps in the accessible journey are interlinked and are of equal importance. If one link is inadequate, the whole journey may be impossible."

*The Human Rights Commission [2005]* explained how the accessible journey is especially important for individuals with disabilities because when every aspect of the journey is accessible a city has the potential to be fully inclusive. Creating a fully accessible journey is an important part of creating an accessible city because it leads to universal inclusion in all aspects of society. Without inclusion cities will struggle to be resilient because the whole population is not included.

The concept of shared streets, is an idea that is believed to create a more accessible city for everyone by removing the dependence on cars and creating greater accessibility to other modes of transports, such as walking and biking. However there has been a backlash in the disability community because it is challenging for individuals with mobility disabilities to interact within a shared space that is reliant on having awareness of individuals around yourself. This idea was backed up in the interviews by an interviewee who explained that for individuals with vision impairments “demarcated areas for cars, cyclists and pedestrians are probably better than a shared space.” Previous literature has differing views on shared streets, *Polus and Craus [1996]* explain how the concept of shared streets is supposed to make cities accessible to a wider variety of people. *The Global Design Initiative [n.d.]* also discussed how they thought that shared streets discouraged vehicle activity making the area more universally accessible. However, the idea that shared streets decreases the accessibility and resilience of people with disabilities is discussed by *The US Department of Transportation [2017]*. They explain that the current shared street concept isn’t accessible to individuals with vision impairments because they are unable to use cues for navigation and aren’t able to depend on street users to negotiating the right of way through eye contact and gestures. As a result of this the *Us Department of Transportation [2017]* have developed a new concept for shared street with two main adaptations. First, have a pedestrian priority area within the shared street, so vision impaired individuals don’t need to worry about collisions with bikes and cars, and secondly, have raised crossings and speed management measures to create a safer area for vision impaired individuals to cross. Therefore, through this research it has become clear that shared streets are a concept that could create a more accessible and resilient city. Although, there are still a number of barriers that need to be fixed to create a safer environment for individuals with disabilities to make these shared spaces universally inclusive. Such as creating a safe space for

individuals with vision impairments to interact with, knowing there isn't the potential for cars or bikers in the area.

An idea that was discovered during the literature but wasn't discussed during the interviews was the idea of urban sprawl vs smart growth. These are two concepts for how to expand a city, urban sprawl creates car dependency which leads to a lack of accessibility to other modes of transport such as public transport, biking and walking. (Frumkin, Frank, & Jackson, 2004) Having accessible transport options is an important part of creating a resilient environment. (Newman, Beatley, & Boyer, 2009) Smart growth on the hand, creates a wider variety of transport options and sees accessibility and connectivity as important aspects of city growth. (Frumkin, Frank, & Jackson, 2004) Whilst smart growth is an effective method for expanding cities to create accessible transport modes it can be argued that individuals with disabilities will not see the benefits of smart growth. This is because individuals with disabilities do not reap the benefits from creating accessible biking and walking infrastructure. Therefore, when considering smart growth, an accessible public transport system needs to be incorporated to create an inclusive and resilient environment.

## 8.2. How are Accessibility and Resilience Connected? Does High Levels of Accessibility Lead to a More Resilient City and Vice Versa?

The results from the interviews were overwhelming positive, when interviewees were asked whether or not they believed that a more accessible city would make it more resilient, all but one agreed with this statement. The final interviewee didn't have an opinion on this topic. One of the underlying topics that arose from the interviews was that universal accessibility would lead to increased resilience because there would be less disruption to everyone's lives, including people with disabilities, when a disaster does happen. This also led to a shared belief that resilience is easier to maintain with higher levels of accessibility. A few interviewees also brought up the interesting point that a city cannot be resilient if everyone isn't included, and since accessibility leads to inclusion, it would not be possible to have resilience without accessibility. The practical application of accessibility leading to inclusion which in turn leads to resilience is further discussed in section 8.4 of this research. One interviewee also discussed how they believed creating accessible environments will



make them more resilient because “during a disaster exiting buildings will be easier if they are more accessible, making people and the environment more resilient.” Thus, it was shown through the interview process that creating more accessible infrastructure will help to increase resilience during times of disaster.

The interviews and literature review also uncovered that a decrease in accessibility to the community and urban environment led to a decrease in an individual’s resilience. This was discussed by *Bourke et al [2017]* who explained how in Christchurch after the earthquakes the severe lack of accessibility for individuals with disabilities led to a decrease in their mental resilience. An interviewee discussed how having a mentally fit population was an important part of resilience stating that a mentally fit population is important for having a resilient city. While accessible infrastructure is important for creating a resilient environment, this research discovered that accessible communities is just as important for creating a resilient city. People with disabilities are especially impacted by accessibility to communities and this can lead to severe decrease in mental resilient, as shown through the interviews and literature review. Access to the community means that is easy for an individual to interact with their neighbours, local parks and shopping centres. These are basic necessities for everyday life and several interviewees discussed how in Christchurch people with disabilities still struggle to interact with their communities which create mental health issues and decreased resilience. Reasons for not being able to access communities tend to be a result of small scale access issues including, road works, and inaccessible footpaths and roads. (Committee on the Rights of Persons with Disabilities, 2013) Therefore, this shows that there is another connection between resilience and accessibility.

While there was literature that believed higher levels of accessibility leads to a more resilient city these studies definitions of accessibility differed from this research’s. *Geurs et al [2012]* discussed how increasing the accessibility of transport networks would lead to a resilient city, it didn’t account for people with disabilities and discussed accessibility on a larger scale. This study, while discussing accessibility for everyone, has a specific focus on individuals with disabilities and how smaller scale accessibility issues can lead to increased resilience for this group. Another example of a different perspective on accessibility was in *Rendall et al’s [2011]* research which believed that Christchurch is a resilient city because it had a high level of activities that could be reached by active modes of transport alone. Once

again, this research neglects individuals with disabilities because they struggle to move around with these active modes of transport. Meaning that even through *Rendall et al* believed that Christchurch had a high level of accessibility resulting in increased resilience, people with disabilities would not benefit from this definition of accessibility meaning their resilience will not be increased. This was a topic that led to differing opinions from interview participants and previous research, this has occurred because individuals interviewed in this research had expertise in the disability sector. Whereas the majority of previous research hadn't accounted for individuals with disabilities in their research.

Another concept that appeared during this research was the idea the while accessibility is an important part of what makes a city resilient, on its own it isn't enough. Other aspects need to be added to make any city resilient. This can be seen through "The Ten Essentials for Making Cities Resilient," of which two mention the important of accessibility on creating a resilient city. The other essentials are made up creating organisations to teach resilience, assigning budgets to reduce disaster risk, and early warning systems and emergency management. This idea was also discussed with an interview participant who when asked if they think accessibility creates a more resilient city, answered with "I believe it contributes, on its own it won't. There is a lot of things you need." Another interviewee also expressed how they believed accessibility was a topic five aspect of creating a resilient city. So, while accessibility on its own cannot create a resilient city it is a very important part of what leads to a resilient city because it creates inclusion.

Another idea that was shared by a few of the interview participants that was believed to be a connection between accessibility and resilience was "how do you depict accessible and resilient design?" This is an abstract concept that was not mentioned in any of literature studied and was only discovered during the interview process. This shows that there is guidance and research needed into the depiction of accessible and resilient design. One interviewee explained how they believed that to depict accessible design you need to normalize including people with disabilities in graphic designs of places and spaces. An issue that was discussed during interviews about this idea was that creating design depicting people with disabilities could come across as demeaning to them. Therefore, another issue arose of being able to depict accessibility without it being demeaning or insulting to individuals with disabilities. While there was discussion with interview participants, no

interviewee could give advice on how to depict resilience in a building. This shows that further research is required into this topic.

### 8.3. Can Accessibility Make Christchurch More Resilient to Future Shocks and Stresses that the City Will Face? If so, how?

When asking the question of whether accessibility could make Christchurch more resilient, international examples can be drawn from to gain knowledge from their experiences. As mentioned in the literature review, Shanghai is a city that is rated poorly on resilience scales, including a study done by *Barkham et al [2014]* that rated Shanghai 40<sup>th</sup> out of 50 different cities. The main reason discussed for Shanghai's poor level of resilience was due to the recent population boom that has led to overcrowding in the city. The overcrowding has led to a decrease in accessibility and connectivity in the city. Alternatively, Vancouver was a city that ranked 2<sup>nd</sup> in the study conducted by *Barkham et al [2014]*. One of the reasons given for this high resilience score was Vancouver's accessibility to energy, food and water. Posing the question, does the good level of accessibility to these services play a pivotal part in making Vancouver resilient? Vancouver has also taken measures to create a more accessible public realm for individuals with disabilities by creating accessible buildings, walking paths, public transport, recreation activities and parking. These examples help to show that the level of accessibility within a city can help determine its resilience, meaning for Christchurch to become resilient to future disaster it needs to have a good level of accessibility. This concept is further applicable to Christchurch because it discusses that in a time of disaster access to resources for all is important in how a city copes and becomes resilient. This type of access issue should also help to normalize accessibility issues because it shows that, even though this is talking about accessibility at a city scale, accessibility is an issue that can have massive impacts on the wellbeing of all individuals, especially in disaster situations.

Interviewee participants came up with several ideas to create a more accessible Christchurch to make the city more resilient to future events. One interviewee explained how:

“We need to look at things like where do people travel and are routes people use accessible because there are parts people can't get through very well. We need to

look at our mobility parking and how people travel. There are some destinations that if people were to travel there by mobility van and want to get around the place in the wheelchair it is really hard to get out of the vehicle and get around without being miles away.”

Mobility parking for people with disabilities was one of the big issues that stuck out as a way to make Christchurch more resilient in the future. Currently mobility parking in the CBD is poor, which leads to the majority of central Christchurch being inaccessible to individuals with mobility disabilities. There were a number of interviewee participants who believed creating more accessible mobility parking in Christchurch’s CBD will create a more resilient city, especially for those individuals with disabilities. One interviewee talked about how “there didn’t have to be mobility parking because that wasn’t seen as a priority” which led to several areas in the Christchurch CBD becoming inaccessible to people with disabilities because they simply could not get there. The lack of mobility parking has an impact on resilience levels in Christchurch because without inclusion a city cannot be truly resilient. Therefore, increasing the accessibility of mobility parks in Christchurch CBD will create a more resilient city because it will make Christchurch more inclusive. The idea that inclusion leads to resilience was not uncovered in the literature study during this research however a few interview participants discussed the topic, with one individual stating “you can’t have inclusion if things aren’t accessible... if your whole city isn’t included how are you a resilient city?” The idea of accessibility leading to inclusion which in turn leads to resilience is discussed further in section 8.4 of this research.

Another important feature of creating an accessible and resilient environment in Christchurch is to have grass root movements promoting these ideas. An interviewee explained how they were happy corporations like the Earthquake Disability Leadership Group were “championing accessibility” in Christchurch. Through the literature review provided by *The Earthquake Disability Leadership Group [n.d.]* it became clear that these people-powered initiatives are important in building accessibility through community actions. People-powered initiatives create a stronger sense of community resilience and was also discussed by *Hartz-Karp and Meister [2011]* who discussed that citizens play an important part in communities becoming resilient to climate change action.

## 8.4. Application to the Earthquake Disability Leadership Group

This research has been conducted with the EDLG, as a result a number of aspects of this research are applicable to them.

Throughout this research a concept that has developed is the idea that accessibility leads to inclusion and without inclusion a city can't be resilient because the whole population isn't included. Refer to figure 9 below for a visual representation of this concept. This idea is important for the EDLG because they are trying to push organisations to create a more accessible urban environment in Christchurch. With the increasingly high levels of individuals living in Christchurch with disabilities, approximately 150,000 as outlined by *Statistics NZ [2015]*, the idea of an inclusive city is becoming more important. A city cannot be resilient if around a quarter of the population can't access the urban environment because the way the environment is designed restricts their ability to be accessible. In Christchurch specifically, the current phase of a rebuild means that the city is in a good time to create an accessible and inclusive environment. Having research that provides evidence on the importance of an accessible environment will be beneficial to the EDLG. This is because the EDLG are trying to create an accessible environment in Christchurch that will be universally inclusive for individuals with disabilities. Resilience is such an important topic in Christchurch since the 2010/2011 earthquakes that creating a resilient city has become one of the most sought-after outcomes of the rebuild. Providing evidence to show that accessibility is a key requirement for making Christchurch resilient will help to show individuals and organisations in charge of that rebuild that accessibility should be included in the design of all new places and spaces.

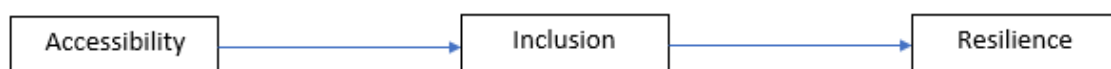


Figure 9: Accessibility and Resilience Concept

Another aspect of this research that is applicable to the EDLG is how to create accessible streets around Christchurch that will lead to increased resilience. It has already been discussed in section 7.1.6 of this research that the St Asaph Street cycle lane in Christchurch has created barriers for individuals with disabilities as a result of a lack of consultation. *The UK Department of Transport [2007]* showed that when new streets are created within cities there is a hierarchy of design that should be followed. Figure 10 below outlines this hierarchy and shows that whenever a new urban environment is designed pedestrians need to be considered first before anyone else. (The UK Department of Transport, 2007) The interviewees outlined that pedestrians were not consulted during the design stages of building the new cycle lanes in Christchurch CBD. This had led to a number of barriers, especially for individuals with disabilities that has decreased their accessibility and resilience. In order to make future designs fully accessible and inclusive it is important for the organisations and individuals designing them to consult with pedestrians and individuals with disabilities. This consultation will lead to an increased resilience and accessibility in Christchurch. Therefore, it is valuable to notice the important of consultation and knowledge of people with disabilities and pedestrians when creating urban environments. For Christchurch moving forward this consultation can be created between rebuilders and organisation such as the EDLG to make sure all urban environments are fully accessible and inclusive.

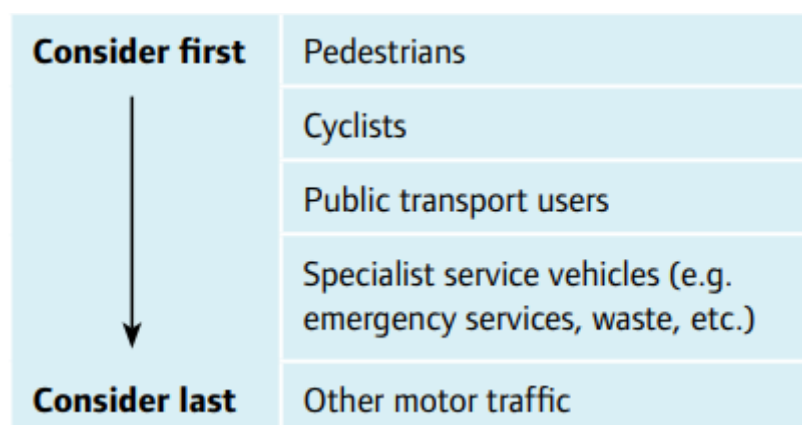


Figure 10: User Hierarchy for Design (The UK Department of Transport, 2007)

This research has explained how there is a gap in knowledge within the design and construction industry in terms of creating an accessible city. This research has discovered that when creating an accessible city, access to the physical environment as well as access to the community are both important. However as discussed in the interview process, physical access is a prerequisite to social access, meaning that access to the physical environment determines whether or not an individual can access social aspect of society. The EDLG has a specific focus on creating universally accessible cities for that facilitates the needs of individuals with disabilities. It has been proven by *Bourke et al [2017]* that individuals with disabilities are increasingly vulnerable to accessibility issues and with such a high percentage of individuals with disabilities living in Christchurch it is important to educate rebuilders how to properly implement accessibility.

The main aspects of an accessible city (discovered during this research):

- 1) Creating accessible infrastructure and transport networks that allow for all individuals to access the environment along every stage of the 'Accessible Journey.' This can be done by enforcing best practice and universal design in the creation of new places and spaces instead of the current minimum standards for accessibility.
- 2) Enhancing community resilience within suburbs and making sure there are support networks created to increase the social resilience of individuals with disabilities. Creating these supports networks is not only something that should be set up by the local councils but also is something that individuals with disabilities should create themselves.
- 3) Engage individuals with disabilities in the planning and design stages of new infrastructure, spaces and plans to make sure accessibility is correctly implemented. This can be done by making sure individuals with disabilities are consulted with by local councils and organisations when new public places and spaces are designed. This will make sure accessibility requirements for individuals with disabilities will be met, leading to universal inclusion and resilience.
- 4) Educating and informing planners, architects, constructors, etc, on how to create an accessible city. This can be done by groups, like the Earthquake Disability Group, educating local organisations on how to correctly achieve universal design.

## 8.5. Limitations of Research

There were a few limitations to this study and these included:

- 1) Time constraints – Sometimes this research felt rushed because of time constraints. If there was further time to research this topic this research would have included a broader range of methods. An online survey would have meant a greater amount of people would have been reached leading to more points of view on accessibility and resilience in Christchurch.
- 2) Sample size – I struggled with booking interviews to a larger sample size because people were busy or away during December and January. While the sample size was restricted to eight individuals I do believe that I managed to get a good pool of individuals with differing perspectives and ideas on accessibility and resilience in post-earthquake Christchurch.
- 3) Current relevant research discussing accessibility and research – while there is a lot of research about accessibility and resilience, it was challenging to find articles where the definitions of accessibility and resilience matched this research's. The majority of current research discussing a connection between accessibility and resilience also neglected the requirements of individuals with disabilities. This meant that a lot of the research and results came from first-hand knowledge during the interviews.

## 8.6. Further Research

This research highlighted the need for more research among the accessibility and resilience sectors, including;

- 1) **How do you change people's perception on accessibility?** This idea arose through interview discussions. In Christchurch especially, a large majority of the population are still yet to accept accessibility when creating new infrastructure and transportation.



- 2) **How do you promote accessibility and resilience to people with disabilities?** This was a concept that arose during this research because it is believed that promoting resilience and accessibility to individuals with disabilities could come across as demeaning. However, if you can't promote accessibility and resilience of the urban environment to individuals with disabilities how can they know when new accessible designs are created?
- 3) **How do you depict accessibility and resilience in design?** This is another issue that arose during this research. When you build accessibility and/or resilience into new infrastructure or transportation how do you depict these concepts when creating designs of these new things?

## 9. Conclusion

This research was looking into the connection between accessibility and resilience, through the case study of Christchurch, to determine if having higher levels of accessibility will or will not create a more resilient city. This study differed from the majority of previous research because it had a specific focus on creating an accessible city for people with disabilities, considering small and medium scale accessibility issues. While this research has acknowledged that accessibility is in fact an issue that affects the whole population, and not just for people with disabilities, the accessibility requirements of individuals with disabilities will lead to an increased accessibility rate for the rest of the population. This research developed three main research questions that have been answered in the results and discussion sections of this research and these were:

- 1) How are accessibility and resilience connected? Does high levels of accessibility lead to a more resilient and resilient city and vice versa?
- 2) What are the key aspects of an accessible and/or resilient city? E.g. Accessible transportation links and infrastructure
- 3) Can accessibility make Christchurch more resilient to future events that the city will face? If so, how?

The literature review helped to answer research questions one and two, however there was little research discussing Christchurch's accessibility and resilience because the topic has only become relevant in the last seven years since the Canterbury earthquakes. The interviews provided the researcher with professional background on all three of the research questions, however more discussion was focused around the accessibility aspect of the research over resilience. This was because a number of interview participants had a greater knowledge on accessibility. Christchurch's accessibility and resilience were also heavily discussed during the interview process.

The literature review found that there is connection between accessibility and resilience, however the definitions of accessibility and resilience differed slightly from this research's. Also, there was very limited research discussing the effects accessibility and resilience on individuals with disabilities. The connection between accessibility and resilience was found

by a few previous researchers who discussed how increasing the accessibility to transport would lead to a more resilient city. It appeared from the literature that the overarching theme connecting these two ideas was that an accessible transportation system can lead to cities becoming more resilient than those without one. The literature review also uncovered that for a city to be accessible it needed to have a few main aspects, these included; access to the physical environment, transportation, information and communication, equal opportunities and inclusion. The literature also uncovered that for a growing city to continue to be accessible it needed to adopt the theory of smart growth over urban sprawl. Urban sprawl is a typical way of a city expanding however it leads to a poorly accessible city. With smart growth, on the other hand, accessibility and connectivity within the city are high.

A more in-depth view was needed on the connection between accessibility and resilience and this connection became clear during the interview phases. The main theme to come out of the interview process was that without accessibility a city doesn't have inclusion and without inclusion a city cannot be resilient. More underlying themes formed during the interview process including; accessibility makes everybody's lives easier meaning in times of disaster being resilient is easier. Interview participants also had differing views on what creates accessible and resilient cities. Themes for an accessible city that arose included; using best practice to create accessible infrastructure and places, normalising accessibility, and education and training in how to create accessible cities. Interviewees believed that the main aspects of a resilient city are; having safe infrastructure, having a physically and mentally fit population, having resilient communities, seeing progress during a rebuild phase and inclusion. When asked how to make Christchurch accessible and resilient to future disasters the interview participants agreed on several themes including; having grass-root movements concerned with accessibility which will lead to increased community resilience, create more accessible transport routes and mobility parking, creating universal inclusiveness, and creating more accessible infrastructure.

This research provided the researcher with a greater understanding and appreciation of the issues people with disabilities face surrounding accessibility and resilience. It is hoped that this research will provide an insight into the reasons why accessibility and inclusion are important issues. Specifically, in Christchurch, it is hoped this research will provide local

organisations with information on why accessibility should be implemented during the rebuild from the September 2010 and February 2011 earthquakes. This researcher firmly believes that creating accessible environments is an important aspect of creating resilient city and should therefore be included in the design and build of new urban environments.

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## Appendix One: Interview Structure

Interview Section	Topic Area	Questions	Probes
<b>Introduction</b>	<p><i>Introduce research; thanks for agreeing.</i></p> <p><i>Info sheet; sign consent; audio recording; explain don't have to answer anything/can stop interview any time without giving reason.</i></p>		
<b>1- Introduction to participant and topic</b>	<i>Place of work</i>	<b>Where do you work? And what is your role?</b>	<p>Accessibility or resilience sector</p> <p>Live here pre-earthquake</p> <p>Definition of accessibility</p> <p>Definition of resilience</p> <p>People from work, family and friends.</p>
	<i>Disability sector</i>	<b>Do you have any lived or professional experience in the disability sector?</b> <ul style="list-style-type: none"> <li>- If yes, what?</li> </ul>	
	<i>Place they live</i>	<b>Did you live in Christchurch before and/or during the 2011 earthquakes?</b>	
	<i>Accessibility</i>	<b>What does accessibility mean to you?</b> <ul style="list-style-type: none"> <li>- Do you believe accessibility is an issue that affects everyone?</li> </ul>	
	<i>Resilience</i>	<b>What is your definition of resilience?</b>	
<b>2- Awareness of the issue</b>	<i>Others understanding</i>	<b>Do you believe people understand the definitions of accessibility and resilience?</b>	
	<i>Accessibility awareness</i>	<b>Are you aware of any issues surrounding accessibility in Christchurch/New Zealand?</b>	
	<i>Resilience awareness</i>	<b>Are you aware of any issues surrounding resilience in Christchurch/New Zealand?</b>	

<b>3- Resilience</b>	<i>Aspects of a resilient city</i>  <i>Christchurch's resilience</i>	<b>What do you think are the main aspects of a resilient city?</b>  <b>Do you believe Christchurch is a resilient city?</b> <ul style="list-style-type: none"> <li>- If yes, what aspects make it so?</li> <li>- If no, what more needs to be done to make it so?</li> </ul>	Social aspects, transportation, built environment  Consider transport, infrastructure and public spaces.
<b>4- Accessibility</b>	<i>Aspects of an accessible city</i>  <i>Christchurch's accessibility</i>	<b>What do you think are the main aspects of an accessible city?</b>  <b>Do you believe Christchurch is an accessible city?</b> <ul style="list-style-type: none"> <li>- If yes, what aspects make it so?</li> <li>- If no, what more needs to be done to make it so?</li> </ul>	Social aspects, transportation, built environment  Consider transport, infrastructure and public spaces.
<b>5- Accessibility and resilience connection</b>	<i>Linking accessibility and resilience</i>	<b>Do you think that having high levels of accessibility will make a city more resilient? And vice versa?</b>	Think about transportation, built infrastructure, community resilience, etc
<b>6- Discussion based on accessibility of Christchurch before the rebuild and present day</b>	<i>Christchurch Policies</i>	<b>Are you aware of the commitments made by the regeneration agencies surrounding accessibility in Christchurch post-earthquakes?</b> <ul style="list-style-type: none"> <li>- Do you believe they are sticking to these?</li> </ul>	Greater Christchurch Recovery Plan, CCC Accessible City Plan.

	<p><i>Christchurch and Disability</i></p>	<ul style="list-style-type: none"> <li>- Do you think the policies were good enough to make Christchurch an accessible city for all? If not what more could have been done?</li> </ul> <p><b>Do you believe that Christchurch is a universally accessible city, including for individuals with disabilities?</b></p> <ul style="list-style-type: none"> <li>- Can you provide an example of a location in Christchurch you believe is universally accessible?</li> <li>- Can you provide an example of a location in Christchurch you believe isn't universally accessible?</li> </ul>	<p>How did it cope in the earthquakes?</p> <p>Can people with disabilities freely use Christchurch the same as those without disabilities.</p> <p>Good example is bus exchange, bad example is Margaret Mahy playground.</p>
<b>7- Conclusion</b>	<p><i>Ending – thank you for your time, if you would like the transcription of your interview I will be in touch, any last remarks?</i></p>		



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17/10/2017

### **Accessibility and Resilience in Post-Earthquake Christchurch**

#### **Information Sheet for Interviewee**

My name is Chris Moore and I am completing my Masters of Urban Resilience and Renewal at the University of Canterbury. These interviews are conducted as part of my master's research project. This project is going to take an in depth look into the relationship between accessibility and resilience in order to determine whether or not cities with high levels of accessibility are more resilient. All of the research linking accessibility and resilience will be brought back to Christchurch to see how resilient and accessible Christchurch is at present, as well as what the city can do to become more accessible and resilient in the future.

The data from these interviews will be recorded and transcribed onto my own personal computer and will be securely stored on the UC servers and my own personal computer. If you choose to take part in this study, your involvement in this project will be answering questions in a semi-structured interview, taking up to a maximum of one hour in time.

There is the potential for emotional and mental stress during the interview. If you exhibit any form of stress you can withdraw from the interview and have all raw data, relating to your interview, destroyed. Please seek advice from Samaritans NZ on 0800 726 666 if you experience stress as a result of the interview.

Participation is voluntary and you have the right to withdraw at any stage without penalty. You may ask for your raw data to be returned to you or destroyed at any point. If you withdraw, I will remove information relating to you. However, once analysis of raw data starts on January 1<sup>st</sup> 2018, it will become increasingly difficult to remove the influence of your data on the results.

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: your identity will not be made public without your prior consent. To ensure

anonymity and confidentiality, only myself and my research supervisor, Angela Curl, will have access to information collected during these interviews. All data collected will be stored securely on my personal password protected laptop along with a backup being stored on a password protected USB drive. Since this is a Masters project, all data collected for this research will be held for 5 years before deletion. A thesis is a public document and will be available through the UCLibrary.

Please indicate to the researcher on the consent form if you would like to receive a copy of the summary of results of the project.

The project is being carried out as a requirement of the Masters of Urban Resilience and Renewal by Chris Moore under the supervision of Angela Curl, who can be contacted at [angela.curl@canterbury.ac.nz](mailto:angela.curl@canterbury.ac.nz). She will be pleased to discuss any concerns you may have about participation in the project.

This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, and participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch ([human-ethics@canterbury.ac.nz](mailto:human-ethics@canterbury.ac.nz)).

If you agree to participate in the study, you are asked to complete the consent form and return to Chris Moore at the beginning of the interview process.

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## **Accessibility and Resilience in Post-Earthquake Christchurch**

### **Consent Form for Interviewee**

- ☐ I have been given a full explanation of this project and have had the opportunity to ask questions.
- ☐ I understand what is required of me if I agree to take part in the research.
- ☐ I understand that participation is voluntary and I may withdraw at any time without penalty. Withdrawal of participation will also include the withdrawal of any information I have provided should this remain practically achievable.
- ☐ I understand that any information or opinions I provide will be kept confidential to the researcher and supervisor and that any published or reported results will not identify the participants. I understand that a thesis is a public document and will be available through the UC Library.
- ☐ I understand that all data collected for the study will be kept in locked and secure facilities and/or in password protected electronic form and will be destroyed after one year.
- ☐ I understand the risks associated with taking part and how they will be managed.
- ☐ I understand that I can contact the researcher Chris Moore (email address: [cjm317@uclive.ac.nz](mailto:cjm317@uclive.ac.nz), phone number: 027 387 6671) or supervisor Angela Curl (email address: [angela.curl@canterbury.ac.nz](mailto:angela.curl@canterbury.ac.nz), phone number: +64 3 369 4104 ext. 94104) for further information. If I have any complaints, I can contact the Chair of the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch ([human-ethics@canterbury.ac.nz](mailto:human-ethics@canterbury.ac.nz))
- ☐ I would like a summary of the results of the project.
- ☐ By signing below, I agree to participate in this research project.

Name: \_\_\_\_\_ Signed: \_\_\_\_\_ Date: \_\_\_\_\_

Email address: \_\_\_\_\_